the centrifugal force of rotation. The direct and reciprocal centres of linear oscillation, at $\frac{2}{3}\ l$ and $\frac{1}{3}\ l$, tend to throw the node at $\frac{1}{2}\ l$ from or toward the centre. The reciprocal centre, $\frac{1}{3}\ l$, is pivotal in respect to the direct centre, $\frac{2}{3}\ l$, thus producing a secondary centre of linear oscillation at $\frac{5}{9}\ l$. This indicates the relative *vis viva* of radial projection which corresponds to an oscillatory tangential *vis viva* of $l$. The corresponding relative velocity is $\sqrt{\frac{5}{3}}$.

410. *Propagation of Explosive Waves.*

Berthelot and Vieille (*Ann. de Chim. et de Phys.*, xxviii, 293) give the equation $\theta_1 = \theta_0 \sqrt{\frac{Q+q}{q}}$, in which Q is the amount of heat set free at the moment of chemical combination; $q$, 273 times the specific heat; $\theta_1$, the velocity of explosive translation of gaseous molecules; $\theta_0$, the velocity of mean translation after the explosive wave has ceased to exert any influence. They have verified the formula approximately, for a score of gaseous mixtures of very various compositions. They think that in the act of explosion a certain number of molecules are thrown forward with all the velocity corresponding to the maximum temperature developed by the chemical combination; this movement is transmitted from one inflamed edge to another, in a wave which is propagated with a velocity either identical, or comparable, to that of the molecules themselves.

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## *Introduction to a Study of the North American Noctuidæ.* By A. R. Grote, A. M.

*(Read before the American Philosophical Society, June 16, 1883.)*

In my "List of the Noctuidæ," 1874, the "Check Lists" of 1876 and 1882, my "Illustrated Essay" and a number of different papers, I have explained the characters of *Noctuidæ*, a family of moths of nocturnal habit and of very general distribution. These structural features, which are used in establishing genera and other divisions are briefly summarized as follows, taking the three divisions of the body in turn:

I. The *Head:* character and structure of the compound eyes, which are either full or ovate, small, large, or more or less constricted, and have their surface naked or studded with hair, and the orbits sometimes provided with longer hair, dependent over the eye and called *lashes;* the character and structure of the clypeus or front, between the eyes, which is swollen or flat and sometimes provided with a tubercle, or horns of various shapes and sizes, or a depression; the presence of ocelli; the shape and size of palpi and tongue; the vestiture of the different parts.

II. The *Thoraæ:* the shape of the wings, their squamation and neuration; the structure of the feet, the tibiæ being variously spined, or armed with claws, or again unarmed, the tarsi which are always spinose show a variation in the character of the spines; the shoulder covers or patagia may be either deflected or closely applied; the collar which varies in size and shape.

III. The *Abdomen:* its comparative length and form; the male genitalia which vary in shape, the female ovipositor may be protruded or not.

General characters may be drawn from the vestiture and tuftings along the dorsal lines of the body. The clothing of the thorax varies from hairy to being composed wholly of flattened scales. I have also used the infraclypeal plate at the base of the "front," which is variously produced and in *Rhodosea* seems slightly mesially projected. Comparative characters are offered by the size of the appendages, width of clypeus, the retraction or projection of the head. Secondary sexual characters are to be used as of generic value when they are of such a nature, that if shared by both sexes they would be held sufficient to found a genus upon. This would exclude the antennæ from their variability, so far as the usual pectinations are concerned, but admits such abnormal male characters as are offered in the antennæ of the genera *Renia, Syllectra,* etc.; also the genitalia, upon which sections may be founded, but which do not seem to be sufficiently stable in their modifications to form part of the diagnosis. The color and pattern of ornamentation often give a clue to the affinities of a species and, in my opinion, should not be entirely disregarded, but afford no ground by themselves to establish any structural group. The immature stages, egg, larva and chrysalis should also be studied, and they will often give a certainty as to the location of a form not to be attained in any other way. Unfortunately they are generally unknown; on this account alone our classification is provisional and it must remain so to a greater or less extent so long as the natural history of the family is not completely known and studied.

The family *Noctuidæ,* then, may be said to contain moths, having 12-veined forewings, of which vein 5 belongs to the series attached to the median vein, being nearer vein 4 than vein 6, except in the genus *Nolaphana,* where it seems to be nearly central in its location, and having two internal free veins on the hindwings. This latter character divides them from the *Pyralidæ,* a family which the lower genera of the *Noctuidæ* approach in general form. The former character separates them from the *Geometridæ,* a family which is lower and next succeeds the *Noctuidæ,* as may be seen from the fact that the larval form which is characteristic of the *Geometridæ* only obtains in certain lower genera of *Noctuidæ,* which, in the perfect stage, also show a tendency (*Homoptera*) to copy the position of the wings in repose, and the ornamentation habitual with the *Geometridæ.* The wings in the *Noctuidæ* are entire, except in *Eulintneria,* in which genus the male has a slip on the external margin, a secondary sexual character of generic value. They have a simple frenulum in the

males, which is divided (not "double") in the females. The wings may be said to be short and narrow; they broaden in the lower genera and again in some genera may be said to be long in comparison with the body (*i. e.*, *Cucullia*, etc.). The ocelli are almost always present, while in the *Geometridæ* they are almost always absent. The palpi lengthen as we descend to the lower genera, where they assume unusual shapes as in *Palthis*. The male antennæ are ciliate, bristled, brush-like or toothed and pectinate, the female antennæ being almost always simpler in structure; *Renia*, *Zanclognatha*, and other genera have them furnished with tufts, coils of hair or nodosities. The "front," or clypeus, is broad and square as compared with either the *Geometridæ* or *Pyralidæ*. The maxillary palpi are short and concealed. The tongue is equally stout, but occasionally short, weak or rudimentary. The eyes are full, and may be either naked or hairy, the hairs being weak and short in *Trichocosmia*, but usually prominent as in *Mamestra*. The orbit of the eye is furnished with a more or less complete circle of hair in some genera, and there is often a circle of discolorous scales lying back from the orbit. The vertex of the head is sometimes clothed with scales, differing in shape and position from those on the "front," which are often short and converge mossily about a central protuberance varying in character. The thorax is short and stout, thickly scaled and often tufted on the dorsal line, with the tufts divided in some genera, and more or less lengthy and peculiar. The metathorax is short; the middle region of the body is well developed as compared with the other families and muscular, the base of the wings and their framework of veins being usually stout and stiff; the flight is most often strong and rapid, and approaches that of the *Sphingidæ*. The habit of hovering over flowers is characteristic of certain genera such as *Plusia*. The abdomen is conical, and usually exceeds the hind wings, the contour is definite; it is variously tufted, or again smooth or with a carina on the dorsal line; again it is flattened, seldom weak or short.

The colors are brown and gray. The hind wings are quite highly colored, but, as a rule, simple and slight in their markings as compared with the fore wings; oftenest they are quite plain or with one or two cloudy lines parallel with the outer margin and a discal spot. The fore wings are usually distinctly lined. They have a basal half-line (b. h. l.), an inner median or transverse anterior (t. a.) line, a median shade (m. s.), an outer-median or transverse posterior (t. p.) line, a subterminal line (s. l.), a terminal line (t. l.) at the base of the fringes. There are three stigmata: the *orbicular*, a rounded anterior spot on the cell; the *reniform*, a usually kidney-shaped spot outward the cell; the *claviform*, a pointed spot attached to the t. a. line below the orbicular. In the genus *Catocala* there is also a subreniform spot, while the claviform is absent. The typical ornamentation is displayed in such genera as *Hadena* and *Mamestra*. Almost always it can be made out and its presence renders a description recognizable if drawn up with care, and the different lines and spots, which are thus easily executed, fully and

comparatively described. The descriptions in French of M. Guenée seem to me very good as a rule, and, as a consequence, but few of his North American species are in doubt. A study of the ornamentation of the *Noctuidæ* is interesting. In related species I found that the differences showed themselves first on upper surface of primaries, then of secondaries, lastly, beneath.

I only mention the genus *Catocala* now to refer to a paper, published by me some twelve years ago, in which I identified one species previously described, and in order to recall the fact that I showed that the origin of the subreniform spot to be the outer median (transverse posterior) line itself. It here set back a sulcation which became gradually separated from the line, and in some species now appears as an almost round spot without any connection with its point of origin. In like manner I conceive the stigmata to have originated. The reniform probably form the median shade, the orbicular and claviform form the inner median (t. a.) line. The spots are then developments from the transverse lines, although it may not be certain whether the reniform is not a relic of a former band, or perhaps of the outer line, though this is not so probable, judging from the course of the median shade, which, in some species, seems to be interrupted by the reniform. Every one has read or should read the best chapter in Mr. Scudder's book on butterflies, that on classification and origin, and will remember his theory of the primitive style of marking, a succession of lines following the shape of the outer margin. It seems quite exact to me from my previous studies of the markings of the *Noctuidæ*. It also works in with my conclusions as to the law of variation in this group, which I showed affected the upper surface of fore wings first, then the hind wings, and then the under surface, following the exposure of the surface, to the light and air.

From these characters we may offer the following *résumé* by which the student may recognize a Noctuid. The front is square and broad, the labial palpi are divergent and prominent, obliquely ascending, the second joint longest and thickly pilose, the ocelli are present, the eyes are full, the tongue stout, the maxillary palpi concealed, the antennæ thread-like, ciliate or brush-like, rarely pectinate in the males. The thorax is heavy and stout, the prothorax broad and distinct, the patagia relieved, the metathorax very short, the flanks broad; the wings stiff, strong and short, the secondaries plain, covered by the fore wings in repose, the primaries 12, the secondaries 8 veined, the latter with two internal veins counted as one; the legs are strong, tarsi spinose, tibiæ sometimes with claws or spines. The abdomen is conical, and exceeds the hind wings, its contour defined. The vestiture is hairy or mixed with flattened scales, usually dense.

The *form* of the *Noctuidæ* (as insisted on by Agassiz as a family character), united three structurally distinct groups, regarded as families by Lederer. The first of these is represented in our fauna by a few species, and is nowhere numerous. No name hitherto employed for it is tenable

under an amended nomenclature. Dr. Harvey and Dr. Packard have shown that the term *Cymatophora* is to be applied to a genus of *Geometridæ*. The terms *Bombycia* and *Noctuobombycini* have not a proper form. Only one of the genera comprising it is beyond dispute, and is represented in Europe, Asia and America by distinct species, viz. : *Thyatira*. I shall call this group, then, *Thyatiridæ*. It differs by the course of vein 8 of the secondaries, and the position of vein 5 of the primaries from all the rest of the *Noctuidæ*. The second family is the *Noctuidæ* proper. It contains subfamilies, which I have designated in my "New Check List," and which I discuss here so far as the present paper extends. Other writers have seen in it three principal groups, the *Non-fasciatæ* of Borkhausen (= *Noctuinæ* of Packard) and the *Fasciatæ* (= *Catocalinæ* Pack.) ; also the *Deltoides* of Latreille, so called from the wings in repose forming the outline of the Greek letter Delta (Δ). At the time of writing his paper, Dr. Packard seems to have regarded the latter as *Pyralidæ*. It is not possible to separate them from the lower *Noctuidæ* as shown by Dr. Herrick-Schæffer. They fall into two subfamily groups : the *Herminiinæ* and *Hypeninæ*. The differences between these groups are a mere extension of the general comparative characters by which smaller assemblages of genera may be defined. I have restricted Dr. Packard's terms to two special groups of smaller extent, and these I believe to have an equivalent value to his subfamily groups in the *Geometridæ*, and which I have discussed above. We have then in the Noctuidæ primarily three familes :

I. THYATIRIDÆ.
II. NOCTUIDÆ.
III. BREPHIDÆ.

This last, again, a group of very limited extent, destitute of ocelli, broad winged and hirsute, has vein 5 midway between 4 and 6, but differing by the neuration of secondaries from the THYATIRIDÆ.

In the *Thyatiridæ* no subfamily groups seem to me recognizable since the discovery of our Western forms, *Thyatira Lorata* and *Bombycia semicircularis*. At first sight the genera *Leptina* and *Bombycia* (= *Cymatophora*), and again the genera *Thyatira*, *Pseudothyatira* and *Habrosyne* (= *Gonophora*) seem to afford two series which in the European fauna appear distinguishable. Hubner was the first to associate these genera, some of the earlier European writers classifying *Thyatira* with *Plusia*. In our fauna *Pseudothyatira* stands nearest to *Habrosyne*, while our species of *Thyatira* approach our two *Bombycide* in several respects.

The general characters of the moths of the *Noctuidæ* I have thus gone over quite fully, and I now mention those of the subfamily groups, after a few remarks which suggest themselves to me, since I finally deal with the subject after a quarter of century of more or less continuous study of it. As to nomenclature, the Preface to Staudinger and Wocke's Catalogue seems to me to give the most practical and feasible rules whereby the choice of names is to be regulated. There should be a uniformity in

family and subfamily terminations, and I am finally opposed to the barbarous names used by Mr. Scudder for these groups in the butterflies.

There is a certain amount of natural error which a student may fall into while gradually becoming acquainted with a large amount of new and differing species, as to which no work was before him, and through which he had to break a path. All things considered, no one in my position could have escaped having to change his views and cancel some of his work. I have always quickly acknowledged and corrected my mistakes, as all who have followed and used my previous writings, I think, admit.

With these explanatory remarks, I would now offer a *résumé* of my conclusion and studies on the family.

It must be acknowledged that the *Noctuidæ* are difficult of limitation as a family by exclusive characters. They may be shown to differ in turn in single points from other family groups of moths, but certain genera in every fauna are difficult to place. As to subfamilies, Lederer shows that these can only be defined comparatively, and not exactly, or, as he calls it, scientifically. The groups here recognized are merely tentative associations of genera to which I have given a subfamily name; they contain all of them genera which may be displaced by future enquiries, but they help the comprehension of the family and enable us to consider certain assemblages together. As to their names, I have not followed any rule of priority; Guenée gives some of them a family form. I have given them a uniform termination, and derived them from the most prominent genus they contain.

The summer, that pulse of the year, the length of whose recurring beat is at once the measure of the time elapsed since the culmination of the last ice period, gives us a prevailing northward direction for the winds that sweep the North American Continent. These offer ærial paths along which numbers of feathery-winged moths are hurried. We have wind visitors from the West Indies upon our shores during the whole season. Some of these become partial citizens by breeding here, others do not, and their lodgment upon our territory is precarious and accidental. The list of species known to visit us in this manner is already somewhat extensive, while the southern part of the peninsula of Florida is occupied permanently by the assemblage of tropical insects. This subject leads us to consider briefly the distribution of our *Noctuidæ*.

The *Geographical Distribution* of the North American *Noctuidæ* must be studied in connection with the topography of the country and the range of the food-plants of the caterpillar. It is found that mountain chains afford the most effective barrier to the distribution of species. Their presence explains the fact that Ohio insects are often absent in New York, or not so abundant on the north and east of the Alleghanies. A study of the ranges and lateral branches of the Rocky mountains, as they are delineated, gives an idea of the different faunal provinces which are discovered to be more or less restricted to the valleys between the spurs. It is shown that, often at short distances in this region, the character of the moths in

adjacent valleys changes. We have essentially one fauna, which is arrested at the St. John's river by a tropical colony inhabiting Southern Florida. The Labrador fauna is a true extension of the Canadian, and the *Noctuidæ* of that region may be found again inhabiting the sides of Mount Washington. I disagree then with Staudinger, who includes the Labrador with the European fauna, believing him to be misled by the identity of alpine species with our more northern forms. On the west our fauna extends downwards along the table-lands occupying the centre of the Mexican peninsula, the hot and low lands on either side being occupied by a different and tropical fauna. Singularly enough some more northern west coast species have been found in Maine and Canada. There must be a northern outlet in the mountain ranges of the Pacific coast. The principal feature in the distribution of our fauna is the migrations. A yearly zoölogical wave sets in from Mexico and the West Indies, and carries on its crest a number of light-winged *Noctuidæ*, which eventually range up our entire coast, and are found in Maine in the fall. The most important to us of these species is the cotton worm, which I have studied a long time. This moth, which feeds on the perennial cotton of South and Central America, must have visited our mainland for years before the cultivation of our annual cotton gave it a lodgment on our soil. Now it increases by the rich fields offered as food for its larva, and traverses the country in successive broods from the South to the Ohio river. Beyond this it flies, but it is doubtful that it again accomplishes its transformations on a substitute food-plant in the fall. The probability is that it does. I originally showed that, in the South, it would feed on nothing but cotcon, from my observations and experiments. I find now that Prof. Riley occupies my ground, and states that it *only* feeds on cotton and that its northern journey is fruitless. I originally discovered that the whole inquiry, from an economical point of view, hinged upon the discovery of its successful hibernation, after being the first to positively ascertain that it wintered as a moth.

In my paper (1874) I suggested that this might still be extra limital or confined to a narrow southern strip of land in Texas or Florida. In this I was probably mistaken, and it may be that it has a hold throughout the cotton belt. But I wish to point out distinctly that this was the matter to be ascertained, and that my theory is to-day the correct one. It showed that the area of successful hibernation was the point for future enquiry, and I suggested in the *Tribune* the means to get this information, and the preventive measures to be employed, if this region was such as could be dealt with by preventive measures in the spring. As to its extra limital origin, Professor Riley finds a short letter anticipating my theory, but necessarily presenting few facts as the range of North American *Noctuidæ* was not then known. However this may be, neither Prof. Riley nor I knew of this letter, when I read my paper in 1874, five years after I had formed my conclusions. To suggest that my theme was not original, is to deal unfairly with the facts. I have shown that Prof. Riley did not

study the cotton worm in connection with the cotton plant. I protest against his Cotton Worm Report as doing me throughout grave injustice. I find even the moths which I named for Professor Baird, which were mistaken for cotton moths by unskilled observers, recapitulated in this report, in which my observation as to the larval feet of *Aletia* and *Anomis* is appropriated. I have named moths for Prof. Riley for twenty years. He even lately tries to make me responsible for his re-description of the "Corn-bud Worm" of Abbott and Smith, the *Laphygma frugiperda* of authors, as a new *Prodenia autumnalis* Riley; and quotes a fragment of a private letter of mine to substantiate the charge. But I never saw the moths till after he had named them, and my letter merely acknowledges the specimens, and gives no opinion on the matter. Since 1864 I knew Abbot's work thoroughly, as shown by my writings on the *Sphingidæ*, and my identification of his species.

As to practical Entomology I allow myself here to express an opinion founded on my experience. The reports of State entomologists often reiterate a good deal, and do not seem to reach the farmers for whom they are intended. An inquiry about the way in which the money of the United States Entomological Commission has been spent with the results attained will show, I am confident, that the facts it has published have not reached the great body of American agriculturists, the principal parties interested.

The system of State entomologists must be changed, and these officials should lecture before the public schools and institute meetings in the county districts, and thus bring the outlines of entomology and a knowledge of common pests before the young. In this way farmer boys will learn to respect robins' nests and pull down the nests of the tent caterpillar instead. As matters are now, it is little use of one man's cleaning out his orchard while another next door keeps a breeding place for the codling moth. Public education must take charge of the matter, and there will then be a prospect of saving much that is now wasted. From a perusal of Mr. Wm. Saunders' excellent book* on "Insects Injurious to Fruit Trees," it is plain that personal labor and mechanical appliances for jarring and gathering or crushing are better than poisons in most cases, and I reiterate here the opinion I expressed at the Saratoga meeting of the American Association, that the use of Paris green is to be deprecated from the liability of poisoning to stock, and the persons handling it, to say nothing of its criminal use which has not unfrequently happened.

In the following arrangement I have given our *Thyatiridæ* and the bulk of the *Noctuidæ* down to the *Catocalinæ* and *Deltoids*. All the genera are here cited, but I have only given the species described by myself as a rule; the other species are cited in my "New Check List," and do not usually give different characters from those here presented, which I have

* This work (which should be used in public schools), from its admirably simple and correct style, its illustrations and arrangement of material used, is entitled to be regarded as the best on the subject since the now classical treatise of the late Dr. Harris.

specially studied. I have also omitted the synonyms and subgenera. I follow this list by a discussion of the twenty-four groups into which I have divided the genera, and conclude the paper by special generic descriptions.

I trust this paper will be of general service to the student, and it is offered as my probably final contribution to a knowledge of this interesting group. The paper was written for the most part several months ago, and was intended to be of wider extent, and include some plates which I cannot now give.

## SYSTEMA NOCTUIDÆ AMERICÆ BOREALIS.

### I. THYATIRIDÆ.

**Habrosyne** Hubn.
Scripta *Gosse.*
**Pseudothyatira** m.
Cymatophoroides *Guen.*
*var.* Expultrix *m.*
**Thyatira** Ochs.
Pudens *Guen.*
Lorata *m.*
**Bombycia** Hubn.
Semicircularis *m.*
Improvisa *Hy. Edw.*
**Leptina** Guen.
Ophthalmica *Guen.*
Australis *m.*
Doubledayi *Guen.*
Dormitans *Guen.*
Latebricola *m.*

### II. NOCTUIDÆ.

1. *Dicopinæ.*
**Eutolype** m.
Rolandi *m*
**Dicopis** m.
Muralis *m.*
Viridescens *Walk.*
Electilis *Morr.*
Depilis *m.*
Thaxterianus *m.*
Damalis *m.*
**Copipanolis** m.
Cubilis *m.*

2. *Apatelinæ.*
**Andela** Walk.
Acromyctoides *Walk.*
**Platycerura** Pack.
Furcilla *Pack.*
**Charadra** Walk.
Propinquilinea *m.*
Derideus *Guen.*
Dispulsa *Morr.*
Palata *m.*
**Raphia** Hubn.
Abrupta *m.*
Frater *m.*
**Feralia** m.
Jocosa *Guen.*
**Momaphana** m.
Comstocki *m.*
**Diphthera** Hubn.
Fallax H.-S.
**Apatela** Hubn.
Occidentalis *G. and R.*
Morula *G. and R.*
Thoracica *m.*
Falcula *m.*
Parallela *m.*
Albarufa *m.*
Paupercula *m.*
Vinnula *m.*
Quadrata *m.*
Tota *m.*
Americana *Harr.*
Dactylina *m.*
Spinea *m.*
Lupini *m.*

Vulpina *m.*
Felina *m.*
Luteicoma *G. and R.*
Distans *m.*
Subochrea *m.*
Noctivaga *m.*
Afflicta *m.*
Connecta *m.*
Harveyana *m.*
Ovata *m.*
Exilis *m.*
Hæsitata *m.*
Dissecta *G. and R.*
Sperata *m.*
Edolata *m.*
Extricata *m.*
Lithospila *m.*
Lanceolaria *m.*
Insolita *m.*

**Arsilonche** Led.

Henrici *m.*
*var.* Evanidum *m.*

**Copablepharon** Harvey.

Absidum *Harvey.*
Album *Harvey.*
Subflavidens *m.*
Longipenne *m.*

**Harrisimemna** m.

Trisignata *Walk.*

3. *Bryophilinæ.*

**Cerma** Hubn.

Cora Hubn.

**Polygrammate** Hubn.

Hebraicum *Hubn.*

**Microcœlia** Guen.

Fragilis *Guen.*
Diphteroides *Guen.*
*var* Obliterata *m.*

**Bryophila** Tr.

Lepidula *m.*

**Cyathissa** m.

Percara *Morr.*

**Chytonix** m.

Sensilis *m.*

4. *Noctuinæ.*

**Carneades** m.

Mœrens *m.*
Citricolor *m.*

**Agrotis** Hubn.

Badicollis *m.*
Janualis *m.*
Pallidicollis *m.*
Opacifrons *m.*
Perattenta *m.*
Attenta *m.*
Stellaris *m.*
Phyllophora *m.*
Rubifera *m.*
Perconflua *m.*
Rosaria *m.*
Planalis *m.*
Hospitalis *m.*
Viralis *m.*
Esurialis *m.*
Quarta *m.*
Apposita *m.*
Fishii *m.*
Normaniana *m.*
Conchis *m.*
Mirabilis *m.*
Innotabilis *m.*
Washingtoniensis *m.*
Treatii *m.*
Juncta *m.*
Haruspica *m.*
Muscosa *m.*
Invenusta *m.*
Terrealis *m.*
Mercenaria *m.*
Auxiliaris *m.*
*var.* Agrestis *m.*
*var.* Introferens *m.*
Perexcellens *m.*
Gularis *m.*
Immixta *m.*
Docilis *m.*
Evanidalis *m.*
Herilis *m.*
Vittifrons *m.*

Insularis *m.*
Costata *m.*
Idahoensis *m.*
Formalis *m.*
Facula *m.*
Emarginata *m.*
Observabilis *m.*
Bimarginalis *m.*
Bicollaris *m.*
Lætula *m.*
Cupida *m.*
*var.* Brunneipennis *m.*
*var.* Alternata *m.*
*var.* Cupidissima *m.*
*var.* ? Orbis *m.*
Variata *m.*
Minimalis *m.*
Placida *m.*
Discoidalis *m.*
Brunneicollis *m.*
Havilæ *m.*
Murænula *G. and R.*
Dolis *m.*
Dapsilis *m.*
Catenula *m.*
Atrifera *m.*
Vernilis *m.*
Euroides *m.*
Milleri *m.*
Vocalis *m.*
Hollemani *m.*
Silens *m.*
Albalis *m.*
Cloanthoides *m.*
Infimatis *m.*
Lagena *m.*
Pluralis *m.*
Pleuritica *m.*
Pitychrous *m.*
Niveivenosa *m.*
Niveilinea *m.*
Olivalis *m.*
Quadridentata *G. and R.*
Cicatricosa *G. and R.*
Ridingsiana *m.*
Lewisii *m.*
Versipellis *m.*
Colata *m.*
Declarata *Walk.*
*var.* Campestris *m.*
*var.* Decolor *Morr.*
*var.* Albipennis *m.*
*var.* Nigripennis *m.*
Verticalis *m.*
Tessellata *Harris.*
*var.* Atropurpurea *m.*
Tesselloides *m.*
Strigilis *m.*
Geniculata *G. and R.*
Collaris *G. and R.*
Badinodis *m.*
Bollii *m.*
Atrifrons *m.*
Piscipellis *m.*
Grandipennis *m.*
Perfusca *m.*
Velleripennis *m.*
Pastoralis *m.*
Balinitis *m.*
Friabilis *m.*
Fuscigera *m.*
Brunneigera *m.*
Rubefactalis *m.*
Micronyx *m.*
Fumalis *m.*
Dollii *m.*
Eriensis *m.*
Worthingtoni *m.*
Sublatis *m.*
Munis *m.*
Violaris *G. and R.*
Wilsonii *m.*
Specialis *m.*
Basalis *m.*
Mimallonis *m.*
Gagates *m.*
Catherina *m.*
Circumdata *m.*
Vancouverensis *m.*
Semiclavata *m.*
Gravis *m.*
Vapularis *m.*

Æneipennis *m.*
Nanalis *m.*
Clodiana *m.*
Texana *m.*
Pellucidalis *m.*
Beata *m.*
Cænis *m.*
Nigrovittata *m.*
Trabulis *m.*
Pressa *m.*

**Anytus** m.

Sculptus *m.*
*var.* Planus *m.*

**Ammoconia** Led.

Decipiens *m.*
*var.* Parentalis *m.*
Distichoides *m.*

**Adita** m.

Chionanthi *A. and S.*

**Eucoptocnemis** m.

Fimbriaris *Guen.*

**Agrotiphila** m.

Montana *Morr.*

5. *Hadeninæ.*

**Fishia** m.

Euthea *m.*

**Copimamestra** m.

Occidenta *m.*

**Mamestra** Ochs.

Purpurissata *m.*
Discalis *m.*
Lubens *m.*
Beanii *m.*
Legitima *m.*
Liquida *m.*
Noverca *m.*
Goodellii *m.*
Vittula *m.*
Farnhamii *m.*
Nevadæ *m.*
Subjuncta *G. and R.*
Atlantica *m.*
Dimmockii *m.*
Bisulca *m.*
Crotchii *m.*
Chartaria *m.*
Defersa *m.*
Bella *m.*
Pensilis *m.*
Vicina *m.*
Acutipennis *m.*
Gnata *m.*
Glaciata *m.*
Cuneata *m.*
Quadrilineata *m.*
Alboguttata *m.*
Comis *m.*
Sutrina *m.*
Lustralis *m.*
Meditata *m.*
Innexa *m.*
Spiculosa *m.*
Ferrealis *m.*
Cinnabarina *m.*
*var.* Ferrea *m.*
Niveiguttata *m.*
Leucogramma *m.*
Insolens *m,*
♂ *Arietis* m.

**Trichoclea** m.

Decepta *m.*

**Lucería** Von Hein.

Delicata *m.*

**Hadena** Schrank.

Ducta *m.*
Separans *m.*
Occidens *m*
Bridghamii *G. and R.*
Violacea *m.*
Hulstii *m.*
Sputatrix *m.*
Plutonia *m.*
Vultuosa *m.*
Cristata *m.*
Lignicolor *Guen.*
*var.* Quæsita *m.*
Genialis *m.*
Auranticolor *m.*
Cuculliiformis *m.*

Vulgaris *G. and R.*
Idonea *m.*
Semilunata *m.*
Discors *m.*
Perpensa *m.*
Cinefacta *m.*
Leucoscelis *m.*
Olorina *m.*
Hillii *m.*
Indirecta *m.*
Tusa *m.*
Tonsa *m.*
Chryselectra *m.*
Charactra *m.*
Genetrix *m.*
Adnixa *m.*
Fumosa *m.*
Longula *m.*
Diversilineata *m.*
Tortilis *m.*
Marina *m.*
Misera *m.*
Cylindrica *m.*
Vulgivaga *Morr.*
Fractilinea *m.*
*var. præc.?*
Modiola *m.*
*var. præc.?*
Hausta *m.*

**Pseudanarta** Hy. Edw.

Crocea *Hy. Edw.*
Flava *m.*
Singula *m.*
Flavidens *m.*
Aurea *m.*

**Oligia** Hubn.

Chalcedonia *Hubn.*
*var.* Tracta *m.*
Versicolor *m.*
Fuscimacula *m.*

**Perigea** Guen.

Epopea *Cramer.*
*Cupentia* Cram.
*Infelix* Guen.
*Confederata* m.
*Condica Palpalis* Walk.
Iole *m.*
Xanthioides *Guen.*
*var.* Enixa *m*, pall.
Luxa *m.*
Falsa *m.*
Albolabes *m.*
Loculosa *m.*
Vecors *Guen.*

**Lussa** m.

Nigroguttata *m.*

**Dipterygia** Steph.

Scabriuscula *Linn.*

**Hyppa** Dup.

Xylinoides *Guen.*

**Hillia** m.

Senescens *m.*
Vigilans *m.*
Algens *m.*

**Valeria** Germ.

Opina *m.*
? Conserta *m.*

**Dryobota** Led.

Stigmata *m.*

**Arthrochlora** m.

Februalis *m.*

**Copivaleria** m.

Grotei *Morr.*

**Oncocnemis** Led.

Hayesi *m.*
Dayi *m.*
Mirificalis *m.*
Behrensi *m.*
Levis *m.*
Pernotata *m.*
Glennyi *m.*
Homogena *m.*
Oblita *m.*
Augustus *Harvey.*
Chandleri *m.*
Riparia *Morr.*
Major *m.*
Aqualis *m.*
Curvicollis *m.*
Cibalis *m.*
Gracillima *m.*
Saundersiana *m.*

Occata *m.*
Atricollaris *Harvey.*
Atrifasciata *Morr.*
Griseicollis *m.*
Aterrima *m.*

**Homohadena** m.

Chorda *m.*
Badistriga *m.*
Vulnerea *m.*
Kappa *m.*
Figurata *Harvey.*
Epipaschia *m.*
Induta *Harvey.*
Incomitata *Harvey.*
Inconstans *m.*
Fortis *m.*
*var.* ? Picina *m.*

**Aporophyla** Guen.

? Yosemitæ *m.*

**Trichopolia** m.

Dentatella *m.*
Ptilodonta *m.*

**Pachypolia** m.

Atricornis *m.*

**Polia** Fr.

Acutissima *m.*
Medialis *m.*
Illepida *m.*
Pallifera *m.*
Ædon *m.*
Theodori *m.*
Epichysis *m.*

**Hadenella** m.

Pergentilis *m.*

**Actinolia** Hubn.

Ramosula *Guen.*
Stewarti *m.*

**Callopistria** Hubn.

Strena *m.*

**Laphygma** Guen.

Frugiperda *A. and S.*

**Prodenia** Guen.

Commelinæ *A. and S.*
Præfica *m.*

**Eupsephopæctes** m.

Procinctus *m.*

**Conservula** m.

Anadonta *Guen.*

**Trigonophora** Hubn.

Periculosa *Guen.*
*var.* V-brunneum *m.*

**Euplexia** Steph.

Lucipara *Linn.*

**Brotolomia** Led.

Iris *Guen.*

**Nephelodes** Guen.

Minians *Guen.*
*var.* Violans *Guen.*

**Tricholita** m.

Semiaperta *Morr.*
Fistula *Harv.*
Inconspicua *m.*

**Admetovis** m.

Oxymorus *m.*

**Helotropha** Led.

Reniformis *m.*
*var.* Atra *m.*
Sera *G. and R.*

**Apamea** Tr.

Purpuripennis *m.*
Nictitans *Bkh.*
Juvenilis *m.*
Erepta *m.*

**Gortyna** Hubn.

Inquæsita *G. and R.*
Cerina *m.*
Rigida *m.*
Cataphracta *m.*
Impecuniosa *m.*
Purpurifascia *G. and R.*
Harrisii *m.*
Speciosissima *G. and R.*
Cerussata *m.*
Necopina *m.*
Serrata *m.*

**Ochria** Hubn.

Sauzalitæ *m.*
Buffaloensis *m.*

**Achatodes** Guen.

Zeæ *Harris.*

**Macronoctua** m.

Onusta *m.*

**Euthisanotia** Hubn.
Timais *Cram.*
**Lathosea** m.
Pulla *m.*

6. *Arzaminæ.*

**Sphida** m.
Obliquata *G. and R.*
**Arzama** Walk.
Densa *Walk.*
Vulnifica *m.*
Melanopyga *m.*
Diffusa *m.*

7. *Nonagriinæ.*

**Nonagria** Ochs.
Permagna *m.*
Subflava *m.*
Oblonga *m.*
**Tota** m.
Armata *m.*
Minorata *m.*
**Senta** Steph.
Defecta *m.*
**Platysenta** m.
Atriciliata *m.*
Angustiorata *m.*
**Tapinostola** Led.
Orientalis *m.*
**Ommatostola** m.
Lintneri *m.*
**Heliophila** Hubn.
Oxygala *m.*
Prægracilis *m.*
Patricia *m.*
Bicolorata *m.*
Rubripennis *G. and R.*
Ligata *m.*
Dia *m.*
Lapidaria *m.*
Adjuta *m.*
Farcta *m.*
Adonea *m.*
Flabilis *m.*
Rimosa *m.*
Pseudargyria *Guen.*
*var.* Callida *m.*
**Zosteropoda** *m.*
Hirtipes *m.*
**Ufeus** m.
Satyricus *m.*
Plicatus *m.*
Unicolor *m.*
Sagittarius *m.*
**Pteroscia** Morr.
Atrata *Morr.*

8. *Scolecocampinæ.*

**Scolecocampa** Guen.
Liburna *Geyer.*
**Eucalyptera** Morr.
Bipuncta *Morr.*
Obscura *m.*
**Doryodes** Guen.
Bistriaris *Geyer.*
**Phiprosopus** m.
Callitrichoides *m.*
**Amolita** m.
Fessa *m.*
**Cilla** m.
Distema *m.*

9. *Nolaphanina.*

**Nolophana** *m.*
Malana *Fitch.*
Triquetrana *Fitch.*
Zelleri *m.*
Labecula *m.*
**Adipsophanes** m.
Miscellus *m.*
**Crambodes** Guen.
Talidiformis *Guen.*

10. *Caradrinæ.*

**Fotella** m.
Notalis *m.*
**Caradrina** Tr.
Miranda *m.*

Fragosa *m.*
Civica *m.*

**Pyrophila** Hubn.

Tragopoginis (Linn.).
Triquetra *m.*

11. *Tæniocampinæ.*

**Orthodes** Guen.

Nitens *m.*

**Himella** m.

Intractata (*Morr.*).

**Tæniocampa** Guen.

Agrotiformis *m.*
Virgula *m.*
Furfurata *m.*
Peredia *m.*
Rufula *m.*
Puerilis *m.*
Perbrunnea *m.*
Consopita *m.*
Garmani *m.*

**Perigrapha** Led.

Normalis *m.*
Muricina *m.*
Behrensiana *m.*
Plusiiformis *Hy. Edw.*
Erythrolita *m.*
Transparens *m.*
Præses *m.*

**Crocigrapha** m.

Normani *m.*

**Xylomiges** Guen.

Hiemalis *m.*
Curialis *m.*
Patalis *m.*
Tabulata *m.*
Perlubens *m.*
Dolosa *m.*

**Morrisonia** m.

Evicta *m.*
*var.* Vomerina *m.*
Infidelis *m.*

**Anchocelis** Guen.

Digitalis *m.*

**Parastichtis** Hubn.

Gentilis *m.*
*var.* Perbellis *m.*

12. *Orthosiinæ.*

**Mètalepsis** m.

Cornuta *m.*

**Pachnobia** Guen.

Carnea *Thunb.*

**Trichorthosia** m.

Parallela *m.*

**Pseudorthoria** m.

Variabilis *m.*
Pectinata *m.*

**Chœphora** G. and R.

Fungorum *G. and R.*

**Pseudoglæa** m.

Tædata *m.*
Blanda *m.*
Decepta *m.*

**Zotheca** m.

Tranquilla *m.*
*var.* Viridula *m.*
*var.* Viridifera *m.*

**Cea** m.

Immacula *m.*

**Calymnia** Hubn.

Orina *Guen.*

**Trichocosmia** m.

Inornata *m.*

**Ipimorpha** Hubn.

Pleonectusa *m.*
*var.* Subvexa *m.*

**Orthosia** Ochs.

Purpurea *m.*
Crispa *Harvey.*
Decipiens *m.*
Ralla *G. and R.*
Euroa *G. and R.*
Inops *m.*
Helva *m.*
Conradi *m.*
Citima *m.*

**Cosmia** Hubn.

Infumata *m.*

**Homoglæa** Morr
Hircina *Morr.*
Carnosa *m.*
**Glæa** Hubn.
Viasica *m.*
Inulta *m.*
**Epiglæa** m.
Apiata *m.*
Decliva *m.*
*Deleta* m.
**Jodia** Hubn.
Rufago *Hubn.*
**Eucirrœdia** m.
Pampina (*Guen.*)
**Scoliopteryx** Germ.
Libatrix *Linn*
**Xanthia** Hubn.
Togata *Esper.*
**Scopelosoma** Curtis.
Pettiti *m.*
Græfiana *m.*
Moffatiana *m.*
Ceromatica *m.*
Devia *m.*
Morrisoni *m.*
Vinulenta *m.*
Sidus *Guen.*
*var.* Walkeri *m.*
Tristigmata *m.*
**Litholomia** m.
Napæa (*Morr.*).
**Lithophane** Hubn.
Hemina *m.*
Petulca *m.*
Gausapata *m.*
Ferrealis *m.*
Bettumei *G. and R.*
Oriunda *m.*
Semiusta *m.*
Contenta *m.*
Georgii *m.*
Antennata *Walk.*
*Cinerea* Riley.
Laticinerea *m.*
Grotei *Riley.*
*Cinerosa* ‖ m.
Unimoda *Lintn.*
Tepida *m.*
Baileyi *m.*
Querquera *m.*
Viridipallens *m.*
Pexata *m.*
*var.* Washingtoniana *m.*
Thaxteri *m.*
Capax *G. and R.*
**Lithomia** Hubn.
Germana *Morr.*
**Calocampa** Steph.
Cineritia *m.*

13. *Cucullinæ.*

**Cucullia** Schrank.
Convexipennis *G. and R.*
Montanæ *m.*
Cita *m.*
Serraticornis *Lintn.*
**Cleophana** Boisd.
Eulepis *m.*
**Nyctophæata** Smith.
Magdalena *Hulst.*

14. *Eurhipiinæ.*

**Ripogenus** m.
Pulcherrimus *m.*
**Marasmalus** m.
Ventilator *m.*
Histrio *m.*

15. *Ingurinæ.*

**Ingura** Guen.
Declinata *m.*
Præpilata *m.*
Flabella *m.*
Oculatrix *Guen.*

16. *Anomiinæ.*

**Anomis** Hubn.
Erosa *Hubn.*
Exacta *Hubn.*
**Aletia** Hubn.
Argillacea *Hubn.*

Hostia *Harvey.*
**Pterætholix** m.
Bullula *m.*
**Chytoryza** m.
Tecta *m.*

17. *Litoprosopinæ.*

**Litoprosopus** m.
Futilis *G. and R.*

18. *Calpinæ.*

**Calpe** Tr.
Canadensis *Beth.*

19. *Stiriinæ.*

**Hypsoropha** Hubn.
Monilis *Fabr.*
Hormos *Hubn.*
**Plusiodonta** Guen.
Compressipalpis *Guen.*
**Basilodes** Guen.
Pepita *Guen.*
Chrysopis *m.*
**Stiria** m.
Rugifrons *m.*
Sulphurea *Neum.*
**Stibadium** m.
Spumosum *m.*
Aureolum *Hy. Edw.*
**Chamæclea** m.
Pernana *m.*
**Cirrhophanus** m.
Triangulifer *m.*
**Fala** m.
Ptycophora *m.*
**Plagiomimicus** m.
Pityochromus *m.*
Expallidus *m.*
Tepperi *Morr.*
**Acopa** Harvey.
Carina *Harvey.*
Perpallida *m.*
Incana *Hy. Edw.*
**Neumœgenia** m.
Poetica *m.*

20. *Plusiinæ.*

**Diastema** Guen.
Tigris *Guen.*
**Telesilla** H.-S.
Cinereola *Guen.*
Navia *Harv.*
**Behrensia** m.
Conchiformis *m.*
**Abrostola** Ochs.
Ovalis *Guen.*
Urentis *Guen.*
**Deva** Walk.
Purpurigera *Walk.*
Paligera *m.*
**Plusia** Fabr.
Æreoides *m.*
Metallica *m.*
Contexta *m.*
Putnami *m.*
Striatella *m.*
Formosa *m.*
Mappa *G. and R.*
Dyaus *m.*
Labrosa *m.*
Monodon *m.*
Pseudogamma *m.*
Fratella *m.*
Pedalis *m.*
Viridisignata *m.*
Epigæa *m.*
Sarena *m.*
Pasiphæia *m.*
Sackenii *m.*

21. *Heliothinæ.*

**Lepipolys** Guen.
Perscripta *Guen.*
**Anarta** Ochs.
Cordigera *Thunb.*
Luteola *G. and R.*
Quadrilunata *m.*

Nivaria *m.*
Subfuscula *m.*
Submarina *m.*
**Sympistis** Hubn.
Proprius *Hy. Edw.*
**Pseudanthœcia** Sm.
Tumida *m.*
**Dasypoudæa** Sm.
Lucens *Morr.*
*var.* Luxuriosa *m.*
Meadii *m.*
**Euedwardsia** m.
Neumœgeni *Hy. Edw.*
**Xanthothrix** Edw.
Ranunculi *Hy. Edw.*
**Axenus** m.
Arvalis *m.*
**Pseudatamila** Sm.
Vanella *m.*
Perminuta *Hy. Edw.*
**Heliaca** H.-S.
Diminutiva *m.*
**Heliosea** m.
Pictipennis *m.*
**Heliophana** m.
Mitis *m.*
**Heliolonche** m.
Modicella *m.*
**Melicleptria** Hubn.
Celeris *m.*
Pulchripennis *m.*
Villosa *m.*
Persimilis *m.*
Honesta *m.*
Sueta *m.*
*var.* Californiensis *m.*
**Dysocnemis** m.
Belladonna *Hy. Edw.*
**Melaporphyria** *m.*
Immortua *m.*
Prorupta *m.*
Ononis *Fabr.*
**Heliochilus** m.
Paradoxus *m.*
**Heliothis** Hubn.
rmiger *Hubn.*
*var.* Umbrosus *m.*
Lupatus *m.*
Cupes *m.*
**Pyrrhia** Hubn.
Angulata *m.*
Stilla *m.*
**Oxylos** m.
Citrinellus *G. and R.*
**Alaria** Westw.
Gauræ *A. and S.*
**Rhodophora** Guen.
Florida *Guen.*
**Rhodosea** m.
Julia *m.*
**Derrinia** Walk.
Stellata *Walk.*
*var.* Henrietta *m.*
**Rhododipsa** m.
Volupia *Fitch* (m.).
Miniana *m.*
**Ædophron** Led.
Snowi *m.*
**Lygranthœcia** G. and R.
Marginata *Haw.*
*Rivulosa* Guen.
Thoreaui *G. and R.*
Saturata *m.*
Separata *m.*
*var.* Balba *m.*
*var.* Acutilinea *m.*
*var.* ? Coercita *m.*
Velaris *m.*
Tertia *m.*
Limbalis *m.*
Acifera *Guen.*
*var.* Spraguei *m.*
Brevis *m.*
*var.* Atrites *m.*
Meskeana *m.*
*var.* Rufimedia *m.*
Packardii *m.*
Mortua *m.*
Nobilis *m.*
**Euleucyptera** m.
Cumatilis *m.*
Tennescens *m.*
**Tricopis** m.
Chrysellus *m.*

Hulotia *Tepper.*
Aleucis *Harv.*
**Pippona** Harv.
Bimatris *Harv.*
**Antaplaga** m.
Dimidiata *m.*
Sexseriata *m.*
**Grotella** Harv.
Septempunctata *Harv.*
Dis *m.*
**Oxycnemis** m.
Adrena *m.*
**Triocnemis** m.
Saporis *m.*
**Pseudacontia** Sm.
Crustaria *Morr.*

22. *Acontiinæ.*

**Trichotarache** m.
Assimilis *m.*
**Tarache** Hubn.
Flavipennis *m.*
Abdominalis *m.*
Lanceolata *m.*
Angustipennis *m.*
Sutrix *m.*
Binocula *m.*
Virginalis *m.*
Cretata *G. and R.*
Terminimaculata *m.*
**Chamyris** *Guen.*
Cerintha Fr.
**Xanthodes** Guen.
(?) Buxea *m.*
Trileuca m.
Rectifascia *m.*
Gulnare *Streck.*

23. *Eustrotiinæ.*

**Lithacodia** Hubn.
Bellicula *Hubn.*
**Annaphila** m.
Diva *m.*
Divinula *m.*
Decia *m.*
Depicta *m.*
Danistica *m.*
**Eustrotia** Hubn.
Malaca *m.*
Mitographa *m.*
Secta *m.*
Concinnimacula *Guen.*
*var.* Parvimacula *m.*
Synochitis *G. and R.*
Musta *G. and R.*
Retis *m.*
Distincta *m.*
Caduca *m.*
Mariæ *m.*
Aeria *m.*
Dividua *m.*
**Escaria** m.
Clauda *m.*
**Euherrichia** m.
Monetifera *Guen.*
**Thalpochares** Led.
Ætheria *m.*
Orba *m.*
Fortunata *m.*
Perita *m.*
**Tripudia.**
Quadrifera *Zell.*
Flavofasciata *m.*
Basicinerea *m.*
Lixiva *m.*
**Gyros** Hy. Edw.
Muirii *Hy. Edw.*
**Spragueia** m.
Magnifica *m.*
Plumbifimbriata *m*
Pardalis *m.*
Funeralis *m.*
Sordida *m.*
Guttata *m.*
Inorata *m.*
**Fruva** m.
Fasciatella *m.*
Obsoleta *m.*
Georgica *m.*
Apicella *m.*

**Azenia** m.
Implora *m.*
Edentata *m.*
**Prothynia** Hubn.
Coccineifascia *m.*
Rosalba *m.*
Orgyæ *m.*
Plana *m.*
**Xanthoptera** Guen.
Nigrofimbria *Guen.*
Clausula *m.*
**Exyra** m.
Semicrocea *Guen.*
Fax *m.*
Rolandiana *m.*
**Lepidomys** Guen.
Irrenosa *Guen.*
**Metoponia** Dup.
Obtusa *H.-S.*
Perflava *Harv.*
**Galgula** Guen.
Hepara *Guen.*
Subpartita *Guen.*

24. *Hyblæinæ.*

**Hyblæa** Fabr.
Puera *Fabr.*

1. *Dicopinæ* m. In this section are grouped genera with the head sunken, the squamation rough or thick, the abdomen tending to be weak and plump, as in the *Apatelinæ*, the tibiæ unarmed except by a strong claw on anterior pair, the ocelli present, the male antennæ thick and stoutly pectinate, the eyes naked and lashed, the labial palpi short, the tongue moderate, the chrysalis hibernates, and the moths appear early in the year. As to the ornamentation it is typical in *Dicopis*, and agrees with the *Hadeninæ*. I believe the group to be really close to the latter, and would bring the genera either before or after that group. It does not appear to be represented in Europe. As an instance that natural structural characters are only of subordinate value in arranging the family groups, I would instance the genera *Dicopis*, *Copivaleria*, *Oncocnemis* and *Basilodes*, all have naked eyes, unarmed tibiæ with a claw on anterior pair, yet we cannot associate them in a single group, their general appearance and form is so diverse. *Eutolype* is singular for a small central chalybeous tuft of thoracic scales (easily overlooked and removed when the moth is pinned) only noticeable also in *Tolype* and *Eudryas;* there is a somewhat analogous posterior tuft in *Oxycenmis*. *Copipanolis* is a very singular Bombyciform genus, reddish in color with variably thick median lines, narrower in the female, found from Massachusetts to Texas. There is a faint resemblance to the European genus *Panolis*, but on the whole, I think, a mere analogy.

2. *Apatelinæ* m. This is Boisduval's *Bombycoidea.* The genera are more or less like *Notidontidæ* or *Dasychirinæ* as to moth and larva. The wings are even, the body plump, often the males have pectinate antennæ, though the typical genus was then simple. The larvæ are usually hairy, bristled and bizarre in appearance. *Apatella Funeralis* has club-shaped hairs, and represents in our fauna the European *A. Alni.* *Raphia* is represented by two species, of which the neuration of *Abrupta* seemed to me to agree with that of *R. Hybris*, the European type of the genus which I have never seen. *Charadra* has hairy eyes, and is nearly related, perhaps not distinct. *Audela* and *Platycrura* seem to me related. The term *Diph-*

*thera* is first used for the European *Aprilina* with which our *D. Fallax* is congenerical, the term *Moma* is incorrectly used for this latter form. For the European *Ludifica*, the term *Trichosea* must be used. The genera *Raphia, Charadra* need a re-examination, which now that several species are described can be profitably undertaken. *Apatela* falls into sections which may in some cases have a generic value.

3. *Bryophilinæ* m. The typical genus has flattened scales on the thorax, and is of slight form, the larva feeding on lichens as observed in Europe. The immature stages of our species are not known. *Cyathissa* differs by its narrow form, and an excision below apices of primaries. *Chytonix* is somewhat stouter, with Hadeniform ornamentation; the type was described by Guenée under *Apamea*, but appears to me to be the male form of *Bryophila Palliatricula* Guen. The thorax is scaled; the species are brown with a white sub-median spot attached to t. p. line, or the median field shaded with white. A new title may be necessary for *Cora*, which in many respects is near *Trisignata*. Perhaps only the three last genera belong strictly to this group.

4. *Noctuiinæ* m. This group I place here following Lederer; it seems to me really lower than the *Hadeninæ* and to have affinities with the *Orthosiinæ*. It comprises the typical genus *Agrotis*, with naked, unlashed eyes, untufted abdomen, spinose tibiæ and smoothly haired thorax with the normal Noctuid markings. I have lately very fully discussed the genus in the pages of the Canadian Entomologist, to which paper I refer the student. *Carneades* differs by the mucronate clypeus; *Anytus* by the lashed eyes; *Agrotiphila* by the constricted eyes; our species of *Ammoconia* by the ridge on the thorax, they may not be congeneric with the European as they seem slighter, but their essential character refers them here. Finally, *Eucoptocnemis* is used for a species of Guenée's described by Mr. Morrison, which differs in the claw to fore tibiæ, and *Adita* is employed for a large species with spinose middle and hind tibiæ but unarmed fore tibiæ provided with a stout claw. *Pachnobia* is referred by Lederer to the *Orthosiinæ*.

The very numerous species of *Agrotis* described by me are here again gone over as far as practicable, and I believe I have retained none but valid species. The type of *Milleri* (named for the poet), is in the fine collection of Mr. Henry Edwards, and disputes with *Hilliana* and *Circumducta*, the claim of the handsomest species among many very pretty but some plain and even ugly (*Cochranii*) forms. I have referred to *Cupida*, all the forms which are possibly varieties, but which no one at first could be blamed for considering distinct. *Alternata* is at least a good variety; I have seen some reddish specimens approaching *Cupida*, but still with pale terminal field. *Cupidissima* is represented by specimens, tending to brownish in Mr. Neumœgen's extensive collection. *Brunneipennis* is applied to small specimens with obliterate markings, very deep red-brown varying to bright orange red. *Orbis* has the orbicular minute, and may be distinct. On the other hand, *Bicollaris*, small with a band on the collar, and *Variata*

much shaded with white are without any doubt on my mind valid species. I have united under the name *Declarata,* all the distinguishable forms allied to the Western type. I think that some of these may turn out distinct, in particular *Albipennis* with whitish secondaries in both sexes, while *Tricosa* and *Subgothica* may be varieties, this cannot, I think, be predicated of *Herilis.* The only yellow-winged *Agrotis* we have, my *Gilvipennis,* is now held to be the same as *Chardinyi* from Siberia. Among our showiest species are *Mimallonis, Bimarginalis, Conchis, Mirabilis, Grandipennis, Mireivenosa, Beata* and *Dollii,* chiefly from the West.

5. *Hadeninæ* m. This group has the eyes full, naked or hairy, the palpi well developed, the second joint pilose and long, ocelli, the body hirsute, and often tufted on the dorsal line, the ornamentation normal. *Fishia* has the tibiæ spinose, *Oncocnemis, Copimamestra* and *Copivaleria* have a claw on front tibiæ, otherwise the tibiæ in this group are unarmed. *Polyphænis herbacea,* described by Guenée, is unknown to me. *Mamestra* has hairy eyes ; I include in it the species of *Dianthœcia* which have the ♀ ovipositor exserted. *Copimamestra* includes the European *Brassicæ,* and has a tibial claw. *Hadena* has naked eyes, otherwise agreeing with *Mamestra. Oligia* is used for very slight species referred by Guenée to *Celæna* in part ; they are glistening and the usual tufts are obsolete. *Perigea* also wants the thoracic tufts except behind the collar, the eyes are naked, the vestiture mixed with scales, silky. The European species of *Dryobota* and *Valeria* have not been examined by me and our North American forms needs to be compared with these ; the same is true of the species referred to *Aporophyla,* and in part of *Palia.* In this genus the last three species form a distinct group ; *Pallifera* seemed to me a true *Polia ;* while *Illepida* is aberrant, with pectinate ♂ antennæ and approaches *Pachypolia.* I have discovered a true *Callopistria* in Florida ; the species formerly referred to this genus I have removed under *Euherrichia* to a later group. *Admetoris* has hairy eyes and extruded ovipositor, and seems to me best placed near *Nephelodes. Tricholita* has the ♂ antennæ pectinate, the vestiture longer, the apices pointed, the size smaller. *Ochria* has the clypeus mucronate, otherwise the species are similar to the forms I arrange under *Gortyna. Macronoctua* approaches the Nonagrians, while as to *Lathosea* I am doubtful of its true affinities. The moth is hirsute with retracted head, and has some resemblances also to the Nonagrians. The Hadenoid moths belong principally to European genera, and should be studied with these in hand. After a very diligent study of European authorities, I find it impossible to arrive at a certainty without the types of European genera to consult. Our fauna is remarkable for the numerous species of *Oncocnemis.* Among the American genera *Hadenella* is to be noted for the clypeal horn and *Lussa* for the long untufted abdomen and narrow wing, looking like a Pyralid ; the genus is from the tropical faunal province of southern Florida, and maybe West Indian also ; I am not certain that it is rightly placed, it has a certain resemblance to *Perigea.* It is difficult to separate some of the species

I have placed under *Gortyna* from *Orthosia*, and perhaps when the early stages are known, and the species more minutely studied, some changes will be found necessary. The principle changes from my classification, however, will probably be made with *Polia*, *Dryobota*, etc.

The true type of *Apamea*, is, I believe, *Nictitans*. The genera *Gortyna* and *Hydrœcia* have the same type, *Micacea*. I have employed the genus *Ochria*, used solely for *Flavago* in the "Verzeichniss," for our two species which have also a clypeal thorn. This character may be trivial, but it is everywhere used, and cannot be rejected arbitrarily. As with *Sphida*, it separates here species I would gladly keep united. From the pectinate antennæ (the opposite of *Nephelodes*), the thoracic tuft and the general contour I would keep *Tricholita*, with its three species, distinct from *Nephelodes;* the white reniform is characteristic, and allies the moths to *Nictitans*. I have a note to the effect that *Semiaperta* had been described previously by Walker, but cannot at the moment find the citation. With some few other changes, the fewer the better, this will be made whenever the British Museum collection is compared with our material. If the idea of justice or injustice can be held to be properly associated with matters of this kind, it may be held unjust to restore any of Dr. Walker's names where recognition is a matter of impossibility without reference to the type. This is the case with about three-fourths of his descriptions in the *Noctuidæ*. But, disagreeing with Professor Riley, Mr. Walker's description of *Xylina Antennata* and *H. Signosa* are not of these, and the moths are referred moreover to the right genus.

6. *Arzaminæ* m. This remarkable group has aquatic larvæ, with spiracles, as discovered by Prof. Comstock, and the larvæ may be taken in the leaves of pond lilies and other water-plants and swimming free in the water. They inhabit ponds from Canada to Florida, and the chrysalis may be found under stones and logs on the margin. *Obliquata* is found in Niagara river, the pupa having occurred on Strawberry island. *Vulnifica* has been found at Ithaca, and what is probably a variety, with the anal tuft blackish, in Florida lakes. *Diffusa* has been found in Maine and also collected by Mr. Moffat in Canada. The moths are very thick-bodied and heavy insects, remarkable for the large female anal tuft, like that of some forms of *Bombyx*. *Sphida* has the clypeus mucronate, *Arzama* unarmed; the difference is very slight and unessential.

7. *Nonagriinæ* m. This, to me the most interesting subfamily of the group, is equivalent to the *Nonagriadæ* of Dr. Harris. The eyes are full, naked or hairy, the thorax smoothly haired, rarely with a crest, the abdomen untufted. The wings are rather narrower and longer than usual, most often of a pale buff, or the color of dried reeds. The moths are found by the sea-coast, or in marshy places quite often, and the larvæ live on grasses. *Nonagria* has naked eyes and a large clypeal protuberance; one species from Florida is of unusually large size. I class here *Tota*, which has somewhat ovate fore wings and a triply pointed clypeal horn; it resembles *Senta* in shape of wing, but the ornamentation is hadeniform. *Tapinostola*

has one undoubted American species, but I am doubtful that I have correctly referred *Senta Deflecta*, of which I have given a figure (which in some copies of my Plate is colored). My genus *Ommatostola* has been examined by Dr. Speyer, and found to be valid as compared with the type of certain European genera not known to me in nature. The moth *O. Lintneri* (the "Dune Wainscot") occurs on the shores of Long Island. *Heliophila*, the typical genus, has hairy eyes and smooth clypeus, in *Ommatostola* the naked eyes are lashed, and the moth is larger than any of our species of *Heliophila*. Following the law of priority, I have adopted this pretty generic name instead of *Leucania*, which latter is proposed by Ochsenheimer without diagnosis while he quotes *Heliophila* of Hubner as synonymous. Our species are very pretty. *Rubripennis* is beautifully shaded with pale red; *Patricia* is a lovely little Western form with a silvery white stripe; a few are obscurely marked and difficult to separate, but all are very interesting. *Unipuncta* (the "Army Worm") is a very destructive species in the East; *Pallens* is also European. The eyes are hairy, the body smoothly haired, the fore wings rather narrow and tending to be pointed at apices.

The genus *Zosteropoda* is remarkable for the long hairs on secondaries above and the tufted legs. *Ufeus* is an aberrant flat form, by the form of the wings referable here, but resembling *Agrotis* in the spinose tibiæ. *Pteroisca*, of which I have seen but not examined the type, is a rough, rather odd looking insect superficially resembling *Ufeus*, but which may not belong here. I do not know *Thaumatopsis longipalpus* Morr., nor *Monodes nucicolora* Guen., the latter may be the same as *Oligia Paginata* of Morrison. Under *Leucania* Guenée, without studying the structure of the eyes, has classified such a dissonant species as *Pseudolimacodes Littera*, probably misled by its color resemblance to some aberrant European *Heliophila*. A number of his species are not known to me, and the synonymy may be disturbed when these and the British Museum forms are accurately known.

3. *Scolecocampinæ*. I first in the North American Entomologist showed the relationship of *Scolecocampa*, *Eucalyptera* and *Doryodes*, uniting the two former which are certainly very little different. The body is slender, linear, the palpi long, the legs long, slender, and unarmed, the fore wings pointed. The ornamentation tends to the development of a central stripe tapering to apices. There is certainly a species of *Doryodes* figured by Geyer, which may or may not be our *acutaria*, but seems to me that species. Guenée refers the moth to the *Geometridæ*, but is corrected by Clemens, who takes occasion to sharply review Gueneé's whole work in a criticism which has become celebrated from the notice taken of it in Europe. Zeller refers *Phiprosopus* also to the *Geometridæ*, but I detected ocelli, and the neuration being also Noctuidous I referred the moth originally to the present family and as allied to *Calpe*. I think now the moth is best placed next to *Doryodes* from its similar form, but it is not without resemblances as to extra European genera which seem related to *Calpe*.

My paper, which is earlier than Zeller's, was published while I was in the South, and the generic name was mis-spelled *Phyprosopus*, how the error occurred I cannot now say ; I derived the genus from *philo* and *prosopus*, shortening the first word from the undue length of the combination. I am led here to review the few cases where my names were misprinted so far as noticed by me. In all cases I made the correction as soon as possible, and in the case of the *Pluria* in the same volume.

Phiprosopus Callitrichoides *as* Phyprosopus Callitrichoides.
Phisia Viridisignata *as* Plusia Viridisigma.
Perigea Sole *as* Perigea Scole.
Hadena Perpensa *as* Hadena Perpenoa.
Oncocnemis Gracillima *as* Oncocnemis Gracillinea.
Heliochilus Paradoxus *as* Heliocheilus Paradoxus.

9. *Nolaphaninæ* m. The genus *Nolaphana* was considered a *Tortrix* by Fitch, and a Lithosian by Zeller. I detected ocelli, and was disposed to consider the moth a Noctuid, which Zeller agreed to, and figured the neuration. Three species are known to me in nature which differ somewhat in structure ; *Malana* has pectinate antennæ, while *Zelleri* has them simple, and in other respects comes nearer my genus *Aeliprophanes* which has a posterior thoracic tuft and longer, Caradrina-like wings, whereas in *Nolaphana* the wings are somewhat fuller and rounded, and the moth looks not unlike a *Nola*, from which ocelli, form of labial palpi and neuration separate it. However, I found vein 5 much more removed from 4 than usual, in a preparation of *Malana*, and perhaps we may not have the best location for the moth yet. *Crambodes* looks a little like the European *Axylia Putris*.

10. *Caradrinæ*. This group contains genera with smooth vestiture, untufted, often flattened abdomen and somewhat narrow palpi. The moths are closely allied to certain Hadenoid genera, and the material arranged under *Caradrina* is possibly not consonant. *Fotella* resembles in appearance the species figured by Herrich-Schæffer as *Bryophila Teratophora*. It is more robust, the fringe on hind wings longer, and the moth seems related to *Acosmetia*. Our species of *Pyrophila* are fewer than the European. The moths all have a greasy or silky look, and are fond of hiding under dead bark, where I have found *Pyrophila Pyramidoides* in numbers associated with *Agrotis Clandestina*.

11. *Tæniocampinæ* m. The forms here grouped have as a rule hairy eyes, retracted head, unarmed tibiæ, and hairy or woody vestiture. They are brown in color and usually hibernate as moths. *Orthodes* and *Himella* are silky, like the preceding *Caradrinæ*, *Tæniocampa* contains species which resemble *Agrotis* in look, and have untufted rather weak abdomen and thick vestiture ; *Incerta* inhabits Europe and America ; some of the forms are rather slight and difficult to separate from *Dianthœcia*, Perigrapha has a medial ridge ; *Crocigrapha* a small tuft behind the collar ; *Xylomiges* is something like *Lithophane* in form of thorax ; *Morrisonia* has

simple antennæ with ornamentation recalling *Cloantha ; Anchocelis* has naked eyes with the clypeus mucronate, our species is much smaller and differs slightly from the European type ; *Parastichtis* (*Dyschorista* Led.), has naked eyes and exserted ♀ oviduct, with somewhat the form of *Dianthœcia.*

12. *Orthosiinæ* m. The numerous genera grouped here seem to fall in between *Tæniocampa* and *Cucullia.* The moths hibernate, as in the former group ; they are colored yellow and brown like the autumn leaves in which they hide, and among them may be found some of our handsomest insects. The eyes are naked, the body as a rule untufted, tending to be flat, the ovipositor is concealed. *Metalepsis* has spinose tibiæ, sunken head, pectinate male antennæ, a hollowed out collar, in front discolorous, untufted thorax, short untufted abdomen, naked, lashed eyes. The moth has probably a European congener. *Pachnobia Carnea* has a more woolly thorax, the collar straight ; it it found in richly colored varieties on Mount Washington and in Labrador ; both these genera have resemblances to preceding group. The ensuing genera have also spinose tibiæ. *Trichorthosia* has hairy eyes and sharply pointed wings. *Pseudorthosia* to the appearance of Orthosia has spinose tibiæ. *Choephira* is broader-winged with stoutly pectinate antennæ, and in the body parts resembles *Zotheca. Pseudoglæa* has a flattened abdomen, and appears related to the European *Mesagona. Cea* is wide winged, slight and mealy scaled, with naked eyes and unarmed tibiæ ; *Calymnia* differs by the smooth front. *Trichocosmia* with similar habit has shortly-haired eyes. *Ipimorpha* (= *Plastenis*) has straight costal margin and sharp apices. The typical *Orthosiæ* much resemble *Hadena ;* they are yellow and brown and the genus contains three stout species. *Conradi, Lutosa* and *Citima* which would be taken for *Hadenæ* with untufted abdomen. *Cosmia* is longer winged, and our species may be the same as the European *Palæacea. Homoglæa* has pectinate antennæ ; *Glæa* simple antennæ and untufted flattened body ; *Epiglæa* has a thoracic ridge. *Jodia* resembles *Trichorthosia* in shape of wings with naked eyes ; the species has sharply pointed wings, and is red in color, and prepares us for *Eucirrœdia* with uneven produced external margin, and *Scoliopteryx* with angulate wings and exaggeratedly tufted flattened body, the tufts like *Eurhipia* which the moth approaches in color and pattern, the flattened body like *Lithophane. Scopelosoma* has a flattened body with a small tuft behind collar and even outer margin ; our species are numerous, in part variable, whether all strictly belong here is a question I am disposed to be pretty confident about, but *Pettiti* and the yellow forms incline to *Xanthia.* Our species of *Lithophane* are numerous ; *Pexata* may be the same as *Ingrica* and *Thaxteri* is regarded as a geographical modification of the European *Conformis.* Till the stages are all known and compared, it is safer to keep our forms under separate names ; they should not be united except under complete evidence, judging from what we know of *Occidentalis* for instance, where the larvæ are so distinct. I incline to believe *Lithomia Germana* is not different from

the European *Solidaginis;* the genus has a tuft behind collar; also our *Calocampa Impera* is closer to the European *Vetusta* than I once thought it to be; *Calocampa Cineritia* is found across the Continent, and is decidedly a different species from either of the European; the same (as to distinctness) is true of the prettier *C. Curvimacula* from the East. In this group *Carnosa* is beyond doubt the handsomest species; even the egg laid in the fall on maple leaves, is of a rich wine-red color. There is a very interesting study opened by the colors of the moths of this group which blend with the ripening leaves among which they hide. Mr. Moffat, a most painstaking observer, has beaten fresh specimens of several *Scopelosomæ* out of oak leaves, in particular *S. Græfiana, S. Moffatiana* and the deeply red *S. Ceromatica,* with its waxy chalybeous shadings, have been captured in this way beautifully fresh.

13. *Cucullinæ* m. The wings are long and narrow, the hind wings reduced in size. The eyes are naked. The antennæ simple, except in *C. Serraticornis,* an anomalous species from the Western coast. The collar is hood-shaped; the body cylindrical, heavy, long and tufted on the dorsum of abdomen which much exceeds the secondaries. *Cucullia* is represented by but few species in comparison with the European, yet all the groups seem represented in our fauna, in which *C. Convexipennis* comes nearest to the European type of the genus. *Cleophana* is represented by two species which have a claw on fore tibiæ, the collar hood-shaped, and the general appearance more like *Cucullia* than the European species. *C. Eulepis,* is a handsomely marked species; *C. Antipoda* was erroneously described as a *Cucullia.* The genus *Nyctophæata* was described by me almost simultaneously as a Heliothid under the name of *Epinyctis.* The naked lashed eyes, the hairy vestiture, the absence of a hood-shaped collar, the sunken head, the truncate, thickly spined tibiæ are all Heliothid characters, and bring the moth near to *Grotella* and allied genera. Its describer excludes it from the Heliothians, and does not indicate its position. After seeing a very fine specimen of the beautiful moth in Mr. Neumœgen's large collection I can only place it here from the long narrow wings and stout body; but it contradicts the main features of the group so much that the form alone unites it, and my original position for the moth may finally be found the most natural. The Rev. Mr. Hulst's paper is, I find, dated two months before my own in "Canadian Entomologist" so that my *G. Notatella* has to be dropped for *N. Magdalena.* The moth is among the most beautiful and elegant of the family.

14. *Eurhipiinæ* m. This group agrees with *Cucullia* in the small hind wings. The genus *Ripogenus* is close to the European *Eurhipia,* but differs in detail in the shape of primaries and tuftings of the body. The moth is provided with two terminal abdominal tufts, one on each side, and is tufted along the dorsal line, with longer tufts on the basal segments above. The moth is of a beautiful brownish-red of various shade, with a bluish patch on median field below enclosing yellow dots. Apices shaded with bluish-white; two superposed dots in place of reniform; transverse

lines pale, irregular; the terminal narrow field and the sub-basal field of a deep rich brown. Hind wings white at base, with a black subterminal shade band followed by a terminal rich brown edge. The margin is angulated on both wings. The other genus *Marasmalus* is narrower bodied, and has the remarkable faculty of holding the wings when at rest like a fan. The two species occur from Maine to Texas; the larger and handsomer *M. Ventilator* is colored like *Ripogenus;* the other is darker and more obscurely tinted, and apparently not uncommon. I took the generic name of *Pulcherrimus* from the Indian, as its colors and ornamentation lent themselves to my fancy as being like the work made by our North American Indians; I did not know then, twenty years ago, that it had a near ally in southern Europe. The names in the other genus are suggestive of the fan-folded wings, which my friend Sanborn likened to those of *Tettix,* and the way in which the moths seem suddenly to disappear. *R. Pulcherrimus* is one of our handsomest Noctuids of this division of the family. I do not think the European fauna has anything prettier than our *Agrotis Hilliana, A. Circumdata, Oncocnemis Atriafasciata, Homoglæa Carnosa, Nyctophæta Magdalena, Ripogenus Pulcherrimus, Rhodosea Julia, Rhodophora Florida, Euleucyptera Cumatilis. Adonisea Pulchripennis, Dasypoudæa Lucens* and *Meadii,* while in the Plusias, those brilliant gems of color, our *Plusia Mappa* is hard to beat.

15. *Ingurinæ* m. The genus *Ingura* is characterized by the antennæ of the male being pectinated at base, the pectinations decreasing suddenly at tip. This form gives the genus a notodentiform look, which Mr. Walker has availed himself of to classify some of our species among the Bombyces. The abdomen is cylindrical, the wings rather narrow and the rounded secondaries are rather small. There is thus a certain resemblance to the preceding groups. Hubner figures a species, which I have not made out, in the "Zutraege," and this seems the earliest notice of any species. The colors are black and dingy, and the ornamentation offers a certain resemblance to *Abrostola.* But *Oculatrix* is an exception, the species having pinkish eye-like markings on the fore wings, and being a showy little insect. In structure it cannot be doubted the genus stands next to *Marasmalus.*

16. *Anomiinæ* m. This subfamily is characterized by the large naked eyes, the smoothly scaled body, tapering abdomen and close silky vestiture. The wings tend to be wide and perhaps *Eulepidotis* belongs here. The larva are half-loopers and approach the *Plusia* type. *Anomis* has the wings angulated, and the type *Erosa* is colored not unlike *Xanthia;* the larva has an additional pair of feet developed as compared with *Aletia.* In a study of the false or abdominal feet of caterpillars, I find that there is always some indication in the Noctuid genera which have the superior pair aborted, of the position of these feet, and that the discontinuance of use and the consequent arching of the body at this point is very gradual. *Aletia Argillacea,* the cotton worm moth, has been studied by me in the South. It has undoubtedly effected a lodging with us during the latter

part of the last century, owing to the cultivation of cotton upon which it feeds. It came every year with the zoölogical wave which follows the rising thermometer and the extension of summer over the northern part of our Continent. I discovered that the moth hibernates with us (where it occurs) as a moth, and that it gradually proceeds northward, breeding as it goes, until in the early fall months it has passed the area of cotton growing, and is found in Maine and Canada in the months of September and October. In the North it is very probable that it has found a substitute food-plant, though I do not know it, upon which the final brood is matured. But I found out that it was winter-killed over a large region, or surviving, the wintering moths failed to make a spring brood. How far North this state of affairs is complete is not yet ascertained.

To resume my remarks on the *Anomiinæ*. *Pterætholix* has the male primary provided with a blister-like expansion, and the male of the broader-winged *Chytoryza* has a smaller one. It is here that the wings, being entire, and broadening, tend to resemble the *Ophiusinæ*, and make it likely that the large naked-eyed and smoothly-haired *Eulepidotis* belongs more naturally in this subfamily. The body structure is very similar in all the genera here discussed and its type, once apprehended, is easy of detection. The head is broader and freer than in the Drasteria-like group with which I precede *Catocala* and allies. We have at least two species of *Aletia ;* the second a Texan form which may have also a more southern parentage. In form the genus *Aletia* is more typical of the group than *Anomis* with its angulated wings.

17. *Litoprosopinæ* m. This group has the terminal joint of palpi elongated, and resembles *Plusia*, differing by the more robust and untufted body. The eyes are naked ; tibiæ unarmed. The wings are long and without the broadening outwardly, and the tooth at anal angle which characterizes the three next groups. *Litoprosopus* is a tropical form, and Professor Pœy describes a species, *L. Hatney*, from Cuba. Our form is found in Florida.

18. *Calpinæ* m. We have only one genus which is equivalent to the European, and in fact our single species may not be different from *Thalictri*. I do not know *Hemiceras Cadmia* of Guenée, nor whether it really belongs to the present group.

19. *Stirilnæ* m. This group is characterized by rather weak body-parts, the thorax short, having the tegulæ often deflected at the tips, the collar a little relieved, the abdomen untufted, the ovipositor prominent, the wings widening outwardly, and often with a projection at anal angle, the fore tibiæ with a claw, the palpi weak and with small third joint, conical and more prominent in *Basilodes*. As a group it oscillates between *Calpe* and *Plusia* in shape of wing and ornamentation, this being sheeny or metallic quite often, in armature of tibiæ and in appearance (*Plagiomimicus, Acopa*) it presents an occasional resemblance to the *Heliothinæ*. The palpi differ from the *Plusiinæ* as also the untufted abdomen and the impromi-nent head. I have lately reviewed the genera in "Canadian Entomolo-

gist." The perfect insects are fond of flowers and one (*Cirrhophanus*) appears to be an internal feeder in stems or capsules as a larva.

20. *Plusiinæ* m. The head is more prominent, the third palpal article longer, and the body tufted on the dorsal line. These tufts are prominent in *Plusia,* and there is an exaggerated tuft, fan-shaped, on the abdomen in *Behrensia,* a genus which is nearest to *Abrostola. Diastema Tigris* has been sent to Mr. Hy. Edwards from Florida, and seems generically distinct from *Telerilla;* I have not been able to examine it carefully. The species of *Plusia* hover over flowers in the evening like *Sphingidæ;* a few species, *Ni, Precationis, Dydus, Verruca,* I have found active in the daytime, as are several species in the next group. Our species are both numerous and beautiful, but a little darker and richer-colored, less metallic perhaps, than the European. Most interesting are two forms, *Thyatiroides* and *Formosa,* which are mimetic of the genera *Thyatira* and *Leptina* respectively; a curious circumstance when we reflect that *Thyatira* was placed near *Plusia* by certain early authorities.

21. *Heliothinæ* m. The abdomen is conical, untufted, the vestiture hairy, the head usually retracted, the antennæ simple, ocelli present, eyes naked or hairy, often narrowed or constricted, the tibiæ armed, the anterior tibiæ shortened. The colors are bright and pretty, and the species frequent flowers; in the closing blossoms of *Œnothera Biennis,* as described by Prof. Kellicott, who has watched the species in all stages, the moth of *Rhodophora Florida* conceals itself, flower and moth being of the same colors. My arrangement of the genera commences with the nine typical forms *Heliothis* and the genus *Melicliptria,* which I have separated from *Heliothis,* and closes with the usual paler, white genera which show an approach to the following Acontians. As I have shown, I recognized, in 1874, the probable large extent of my genus *Lygranthœcia.* I kept, however, certain forms distinct upon modifications of tibial structure, leaving the responsibility of certain genera with Guenée. But any student with the microscope in hand, and my remarks before him, could have come to the conclusion now reached by Mr. Smith, with a show of originality which is wanting in fact. Mr. Smith unites my species of *Tricopis, Euleucyptera* and *Schinia* with *Lygranthœcia,* for which genus he keeps the term *Schinia,* a name which I alone had "resurrected" for the species described by Hubner, thus destroying my connection with the genus which is essentially my work. These do, in fact, present but slight modification of tibial structure, the changeable nature of which is shown by an excellent plate furnished by Mr. Smith, who, from a comparison of all accessible types, arrives at conclusions which, as a rule, I feel bound and glad to accept. But I believe he goes too far in sinking *Tricopis* and making *Euleucyptera* synonymous. I also believe that *Tertia,* which I had described under *Tamila* (under a mistaken view of the characters of that genus which Mr. Smith now corrects), will prove, with *Cupes,* generically distinct. I refer to some points in the generic descriptions given in this

paper, and now only notice the most prominent characters of certain of the genera.

*Rhodosea* differs from *Alaria* by the fore tibiæ having two terminal claws, else unarmed; these claws are on each side at the extremity of joint; the other two tibiæ are unarmed, although in my first notice I described these tibiæ as sparely pilosa. The genus is remarkable for the apparent slight exsertion of the infra-clypeal plate at the middle, the shape of wings, palpi, give comparative characters to separate the roseate, most delicately colored moth from our Eastern genus *Rhodophora*. This last I keep distinct from *Alaria*, the palpi, colors and pattern of the moth seem to me sufficiently modified as to warrant a different term. I draw in *Porrima* (proposed for *Ovia*), a term which I employed for *Sanguinea*, a moth to which *Regia* is allied, as not distinct enough from *Lygranthæcia*, and, except as to the points here discussed, accept Mr. Smith's conclusions. As to *Cupes*, it is admittedly out of place in *Lygranthæcia*, and I keep it in *Heliothis*, to which it is at least as strongly allied, for the present. I used the narrowed eyes to separate certain genera, and this character is adopted by Mr. Smith, who finds it of great value. It led me to classify *Agrotiphila* in this group, and near *Anarta*. In this latter genus are one or two species (*Submarina*, etc.), in which the hairy eyes are not ovate but full, but which from the untufted abdomen and general aspect and ornamentation I cannot refer to *Mamestra*. *Oxycnemis* is a bright gray moth, looking a little like a species of *Charadra* or even a *Dianthœcia capsularis*, which has short front tibiæ terminating in a single claw, and a posterior thoracic tuft of shining curved scales. It is thus allied to *Triocnemis*, which has the shortened tibial joint of the fore feet also corneous, but tridentate, a posterior thoracic tuft, of which the scales are similar, while the moth recalls in ornamentation the European genus *Calophasia*. *Derrima*, placed by Walker in the *Acontidæ*, which led me to overlook this description, has one pretty species *Henrietta* m., quite common in Rhode Island, where Mrs. Bridgham has collected it. After examining Mr. Walker's type of *Stellata*, which is larger and with pink hind wings and an apparent slight modification of the markings of fore wings, I feel sure that it is only a varietal form of *Henrietta*, though this was next to impossible from the description. I have seen no such specimen among hundreds of *Henrietta* which have passed through my hands, and the only approach to it was a ♀ specimen, collected by Mrs. Bridgham, which had a faint pink flush on hind wings. The genus *Euedwardsia* is based on a fine species somewhat stouter and larger than *Xanthothrix Ranunculi*, with hairy vestiture, unarmed tibiæ, the clypeus with a projection below a cup-like excavation. The eyes are naked, the primaries are rather short and broad, with sharp apices. There will be a difference of opinion as to the value of structure in this group. I do not agree with Lederer in referring *Pyrrhia Umbra* and *Chariclea Delphinii* to one genus. But there is no need of personal criticism, and no mental inferiority or biological ignorance implied in separating certain species upon

slight structural characters. I am inclined to keep in view the general appearance and pattern of the insects in sorting them into genera, this has led me too far in the present group, as shown by Mr. Smith, and I have modified my views in consequence. There may be a question as to two or three genera which I here retain, but no harm is done by keeping them separate, and the natural grouping of the insects is facilitated. In but few cases have I overlooked the characters as charged by Mr. Smith, I have rather failed to recognize their true importance, and, without the European types before me, and wanting some rare American species, it was difficult to avoid making too many genera, considering the strong modifications in armature exhibited by the different species. After having positively referred *Oxylos* to *Heliothis*, Mr. Smith as positively now refers the genus to *Alaria*. Perhaps, when our species are all known, the genus may turn out to be valid; it differs very slightly from *Heliothis* as stated by me, the shape of the wings divide it from *Alaria;* thus I leave it for the present with one or two others, and having again gone over the generic types accessible to me in this group, the present arrangement expresses my final decision and comprehension of the matter.

22. *Acontiinæ* m. This group contains the large genus *Tarache* (*Acontia* Ochs.) which is numerously represented in Africa and Southern Europe. Our American forms are only partially known. The vestiture is scaly, mossy and short on the front, the eyes are full, large, naked and unlashed. The colors are white with shades of olivaceous or purply, on fine dark streaks and scintillant patches. The finest species is *Tarache Lactipennis* Harvey, which simulates *Ciris Wilsonii*. *Trichotarache* differs in the important character of hairs mixed with the body vestiture; it borrows a character from the preceding group; the moth closely resembles *T. Flavipennis* in appearance. *Trileuca* has the shining look of *Tarache*, and in the body parts resembles my *Buxea* from Texas, which has an European analogue, judging from descriptions. The tibiæ are unarmed; both forms have three pale transverse lines, and are of a peculiar fady ochry color.

23. *Eustrotiinæ* m. This group is equivalent to the *Noctuo-Phalænidi* of Boisduval, and contains mostly weak-bodied and frail-winged forms of which a few are remarkably distinct in structure. *Spragueia* differs from the European *Agrophila*, by the absence of vein 5 on the secondaries, and the narrower fore wings, which have the course of the subcostal veinlets modified. *Thalpochares* has no accessory cell; I have examined the neuration alone of *Ætheria* and *Patula*. *Euherrichia* is of a rich brown color with silver spots and lines, and has been confounded with the European genus *Eriopus*, of which latter genus we have a Floridian representative. *Annaphila* is a curious Californian genus, the species looking like miniature *Catocalæ;* the genus appears to me related to *Eustrotia*. *Azenia* is remarkable for the clypeal structure. *Exyra* has a roughly haired thorax, and the species feed, in the larval state, on the Pitcher Plant (*Sarracenia*). The economies of nature are very curious. While many flowers, in losing their honey, have their seeds ripened by the pollen brought to the ovary

attached to the moth or bee that steals their sweets, in the genus *Saracenia* the leaves are eaten by the larva of *Exyra*, the moths of which are afterwards caught in the trap which first helped them to exist. The insect first devours the plant, and then the tables are turned, and the plant catches the moth which eat its leaves as a caterpillar. The species of *Exyra* are all pretty, while *E. Rolandiana* is one of the most beautiful of our smaller *Noctuidæ*, in fact few equal it in depth and richness of coloring. *Prothymia coccineifascia* has beautiful waxy, red stripes on its yellow wings, while for bright and elegant markings and high color few natural objects are as exquisite as *Spragueia Leo* and *S. Magnifica*. The latter species, from Arizona, is even handsomer than the species of the Tineid genus *Æta*, which these little *Noctuidæ* somewhat recall. I have worked out the structure of *Agrophila* (*Erotyla*), *Spragueia* and *Xanthoptera* very fully in the pages of the "Canadian Entomologist," edited by my kind friend, Mr. Wm. Saunders.

24. *Hyblæinæ* m. This group is tropical and is composed of singular-looking Noctuids, having tortriciform primaries, pointed apices, smoothly-haired thorax, with pointed palpi. The narrow wings and closely-haired body give the group a resemblance to the *Acontiinæ*. The hind wings are black and yellow, and in many features the group prepares us for such Catocaline forms as *Hypocala*. We have one species from Florida, *Hyblæa Puera* Fabr., which has been apparently redescribed by Mr. Strecker as a new genus and species under the odd name of "*Ænigma Mirandum*," the genus being based on a "very large number of subcostal nervules," an impossible one where it is considered that the number of these veins is invariable.

### FERALIA Grote (1874).

Type: Diphthera Jocosa *Guen.*

The eyes are small, naked, lashed. The head is retracted and the palpi shorter than in *Diphthera fallax*, which latter I regard as belonging to *Diphthera* as Hubner originally intended the genus. The male antennæ are stoutly but shortly bipectinate throughout their length. I could not find ocelli, but Mr. Smith says they are small but present. The vestiture is very shaggy and hairy. The species varies by becoming suffused with black; the fore wings are green, and the female has them pale green with distinct black mesial bands and lunule beneath.

1. F. Jocosa *Guen.* Noct. 1, 47; Grote, B. B. S. N. S. II., 58 ♂, Can. Ent. XV., 28 ♀. Maine; N. York; Canada.

### MOMAPHANA Grote.

Type: M. Comstocki *Grote.*

This genus is allied to *Diphthera*, the vestiture being similar, and the moth otherwise in markings and color resembling *D. Fallax*. The male antennæ are distinctly pectinate, however, and in this resembles *Feralia*, from which it differs by the less retracted head. The single species is so

rare that I never have had but one specimen to examine in which the labial palpi were much shorter than in *Diphthera Fallax*. The eyes were fuller than in *Feralia*, and the body less pilose. The ocelli were present. The moth stands evidently between the *Feralia Jocosa* and *Diphthera Fallax*, and the genus must be again studied, though I do not doubt its validity.

1 M. Comstocki *Grote*, B. B. S. N. S. II., 59 (*Feralia*), Stett. Ent. Zeit. New York.

ADITA Grote (1874).

Type: A. Chionanthi *Abbott and Smith.*

The moth is allied to *Agrotis*, from which it differs by the fore tibiæ being provided with a stout claw as in *Oncocnemis*. Middle and hind tibiæ sparsely spinose, while the front tibiæ seem to have only the terminal claw, and to be destitute of spinules. Abdomen untufted. Male antennæ bipectinate, rather long. Head prominent, eyes full, naked. Fore wings retreating at anal angle. The thorax is crested behind. The moth is figured by Abbott in 1797, and remained undiscovered, and even unnoticed again until 1874, when I found it in a collection made by Prof. Comstock at Ithaca, New York. It is a large, distinctly marked and handsome species, expanding about 42 mil., and has since been found in Massachusetts, but is as yet rare in collections.

1. A. Chionanthi *Abb. & Sm.*, II., Pl. 98; Grote, B. B. S. N. S. II., 63. Mass. to Georgia.

HILLIA Grote.

Type: Hadena Senescens *Grote.*

This genus is allied to *Hadena* with which it essentially agrees, but differs by the retracted head and short body, and the straight costal margin of the primaries, the wings being wide and short, rather than comparatively long and narrow. Male antennæ simple, ciliate; eyes naked, lashed. A tuft behind the collar and on thorax behind. Tibiæ unarmed. Abdomen untufted.

1. H. Senescens *Grote*, Can. Ent. 10, 235, New York.
2. H. Vigilans *Grote*, B. U. S. G. S. 4, 176, Maine.
3. H. Algens *Grote*, Can. Ent. 10, 236, Maine.

I name this genus for W. W. Hall, Esq., of Albany, who collected the type, and has been exceedingly kind to me in scientific matters.

COPIVALERIA Grote.

Type: Valeria Grotei *Morr.*

This form has a roughly haired thorax, the head being somewhat sunken, the male antennæ impectinate. The form is like *Hadena*, but it differs by the claw on front tibiæ. The aspect is not unlike the European genus *Valeria*, and it is removed from *Dicopis* by the longer wings and abdomen.

1. C. Grotei *Morrison.* Eastern and Middle States.

## HADENELLA Grote (1883).

This genus is based on a Hadenoid of slight build, having triangulate, broad wings, the infra-clypeal plate prominent, a curious projecting frontal horn terminating in a navel-shaped expansion. The thorax is tufted behind, the antennæ simple, the eyes naked; a small basal tuft on the abdomen. The little moth is gray, shaded over apices and the middle of the wing with ochreous, thus resembling in miniature *Agrotis Pluralis*. It is of the same slight form, but brighter colored than the dusty gray *Hadena cylindrica*.

1. H. Pergentilis *Grote*. Arizona.

## PSEUDANARTA Hy. Edw. in litt.

Type: P. crocea *Hy. Edw.*

This genus is composed of small Hadenoid forms which have clear yellow secondaries with black borders, and resemble *Anarta myrtilli* in appearance. The eyes are naked, the head not as prominent as in typical Hadenoid species. The antennæ are simple, the vestiture hairy, the thorax tufted. It is a color genus apparently as the tibiæ are unarmed, and beyond the peculiar color, and somewhat compressed form I do not find distinctional characters, although I cannot help believing that such exist. The species are near, but I now believe are all distinct. All but *Aurea* have yellow, this has orange secondaries. The fore wings of *Crocea* are shaded with ochrey and paler than the others. It is probable that the ♀ oviduct is exserted, which would give a slight character.

1. P. Crocea *Hy. Edw.* Colorado.
2. P. Flava *Grote*, Col.; B. Columbia.

## TOTA Grote (1882).

Type: T. Armata *Grote*.

Size small, form compact, fore wings somewhat tortriciform, shaped like the European *Senta*, with hadeniform ornamentation, gray, with faint markings finely outlined. Tibiæ slender, unarmed, fore tibiæ with a short claw. Clypeus with an exceedingly prominent wedge-shaped protuberance, surmounting the greatly exserted infra-clypeal plate. Hind wings rather full, rounded, the fringe prominent. Two species, one larger with pale fuscous or smoky secondaries, the second smaller with glistening white hind wings, resemble each other closely in appearance. On examination, the central point of the clypeal wedge has a shallow depression on top in the second smaller form (*minorata*), in which the head and collar are distinctly ochrey. The larger form (*armata*) has a variety having a submedian and discal black streak; this recalls the *var. Bipuncta* of the European species of *Senta*, although it is the stigmata which are filled with black. The untufted body, the clypeal armature resemble *Nonagria;* the small species have the look of internal feeders.

1. F. Arnata *Grote*, Can. Ent. 175. Arizona.
2. F. Minorata Grote, Can. Ent. 181. Arizona.

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UFEUS Grote (1873).

Type: U. Satyricus *Grote.*

A very flat-bodied, coarsely-haired genus with shiny feet and simple antennæ, the middle and hind tibiæ spinose, as also the fore tibiæ in at least two of the species. The body is untufted, and in form the moths resemble *Heliophila,* and are classified by me at the end of the subfamily group. *Nonagriinæ* m. The naked eyes are lashed. The type is found in Canada, and the Northern States. I suspect it hibernates as a moth. The early stages are unknown.

1. U. Satyricus *Grote,* B. B. S. N. S. I, 101, Pl. 3, fig. 4. Can. to N. Y.
2. U. Unicolor *Grote,* B. U. S. G. S. IV., 179. Illinois.
3. U. Plicatus *Grote,* B. B. S. N. S. I., 102. Can. to California.
4. U. Sagittarius *Grote,* Pap. III., 31. California.

The ornamentation is simple; *Satyricus,* a large species, fuscous, with cloudy medial lines, *unicolor* smoky-fuscous, unlined.

*Plicatus* is brownish-red with medial lines and varies in tint; it is smaller than *Sagittarius,* which has red primaries with a yellow longitudinal streak on cell joining the bow-shaped yellow reniform, while beneath the secondaries have a thick triangulate mark. This species is the most interestingly marked in the genus. The flat form, coarse hair, strongly spinose and powerful feet are unmoth-like, and when I examined *Satyricus* I was reminded of a cockroach, though I confess it requires a strong imagination to even suggest such a resemblance.

FOTELLA Grote (1882).

*Type:* F. Notalis *Grote.*

This genus is related to *Caradrina,* and has a slight correspondence to *Acosmetia* in form, the fringes are long on hind wings. Clypeus with a navel-shaped expansion. Eyes unlashed, naked. Ocelli. Wings full; the color and markings recall *Bryophila Teratophora.* Tibiæ unarmed; body slender, untufted; vestiture silky.

1. F. Notalis *Grote,* Can. Ent. 14, 181. Arizona.

ACERRA Grote.

Type: A. Normalis *Grote.*

This genus is, I believe, synonymous with *Perigrapha* Led. It has the characters of *Tæniocampa,* except that the body seems stouter and shorter, and there is a medial ridge on the thorax. Our species seem to differ by the impectinate ♂ antennæ. The European species have large confluent stigmata, and our first two species have them thus, and very prominently colored, the next two have them also coalesced, but not so prominent, and in the last two the stigmata are separate and inconspicuous. The genus seems to sustain a similar relation to *Tæniocampa,* that *Ammoconia* does to *Agrotis* or *Epiglæa* to *Glæa.*

1. P. Normalis *Grote,* B. B. S. N. S. II., 162; Check List, fig. 4. California.
2. P. Muricina *Grote,* B. B. S. N, S. III., 85. Oregon.

3. P. Behrensiana *Grote*, Can. Ent. VII., 71. California.
4. P. Plusiiformis *Hy. Edw.*, Pac. Coast Lep. 4, 3, Pl. 1, fig. 9. Nevada.
5. P. Erythrolita *Grote*, Can. Ent. XI., 208. California.
6. P. Transparens *Grote*, B. U. S. G. S. VI., 582. Washington Terr.

The genus *Stretchia* of Hy. Edwards, with the type *S. Plusiiformis*, is also synonymous. The handsomest and most striking species is *Muricina;* while *Erythrolita* has much the look of a *Tæniocampa*, its larger ally. *Transparens* has a certain false look of *Phragmatobia*, from its subtransparent rufous primaries with their faint ornamentation. The hairy eyes and the dorsal ridge of scales on the thorax must be observed.

CEA Grote (1883).

Allied in form, texture and vestiture to *Trichocosmia*, between this and *Calymnia*. Eyes naked, unlashed. Vestiture of narrow scales. Antennæ simple. Front wide, rising to an embossed protuberance, around which the short clypeal vestiture circles; infra-clypeal plate distinct. Ocelli. Labial palpi slender, rather weak, with elongate third joint. The body has a pale integument, the outline weak, and the vestiture is not strongly adherent. Tibiæ unarmed; legs rather short and weak, not hairy. Body untufted; abdomen with dorsal carina. Wings entire, rather broad and short; apices determinate and outwardly the primaries are full. One species with thorax and primaries very pale yellow, almost white, immaculate. Hind wings pure silky white above and below, abdomen white, expands 27 mil.

1. C. Immacula *Grote*, p. III., 78. Arizona.

CIRRHOPHANUS Gr. (1872).

*Type:* C. Triangulifer *Gr.*

The eyes are full, naked, unlashed. The clypeus has a central rounded tubercle. The vestiture consists of hair-like scales with broader ones, arranged like shingles, rising from the thorax, which is short and in shape allies the moth to this group. The fore tibiæ are also not truncate, but as long as in the preceding genera and unarmed. The parts of the thorax resemble the preceding genera, but there is a divided posterior tuft. The patagia are not as deflected as in *Plagiomimicus*, but do not lie close to the thorax. The female ovipositor is not exserted. The abdomen is untufted. The labial palpi have the terminal joint concealed, and are not unlike, though longer, the palpi of the genera separated here from *Basilodes*, but unlike that genus. The antennæ have the basal joint scaled. The palpi are rather thickly haired. The tibiæ are unarmed. Wings ample, without tooth, rounded exteriorly, with blunt apices, and running in a little and forming a prominent angle at internal margin. The genus seems to be somewhat intermediate between the preceding and *Plusia*. The species is golden-yellow with orange-brown lines disposed somewhat like the European *Chariclea Delphinii.*

1. Triangulifer *Gr.* Ohio, Missouri.

*Pretiosa* Morr. (Chariclea).

CHAMAECLEA Gr. (1883).

*Type:* C. Pernana *Gr.*

Allied to the genera typical of the *Stiriinæ* by the bulging clypeus and Plusia-shaped wings. Front with a slight depression, rising in the middle. Vestiture scaly. Tibiæ unarmed; in all the examples I have seen the fore legs are broken off. Fore wings wide, produced at internal angle. The tegulæ are not deflected; the thorax short. ♂ antennæ simple.

1. Pernana *Gr.* Arizona. This genus is curious for the way in which *Chamæclea Pernana* mimics *Chariclea Delphinii.* The type is figured in my Illustrated Essay on the Noctuidæ of North America, Plate III. fig. 27.

PLAGIOMIMICUS Gr. (1873).

*Type:* P. Pityochromus Gr.

Front with an empty and exposed cup-shaped protuberance, the frontal scales being short and mossy. A slender terminal claw on front tibiæ. In *Tepperi* the frontal excavation is less prominent, but otherwise this species agrees. As compared with allied genera, the three species are slenderer and have a casual resemblance to the Heliothid genera *Schinia* and *Lygranthæcia.* As in *Stibadium* the labial palpi are short, here they hardly reach the top of the more prominent infra-clypeal plate in the more typical forms. The species are olivaceous fuscous (*Pityochromus, Expallidus*), or of a delicate olivaceous green (*Tepperi*). Both Mr. Morrison and Mr. Smith wrongly give the fore tibiæ of *Tepperi* as unarmed.

1. Pityochromus *Gr.* Mass to Kansas and the South.
   *Schinia media* Morr.
2. Expallidus *Gr.* Montana.
3. Tepperi *Morr.* Southern States, Arizona.

HELIOSEA Grote (1875).

Type: H. Pictipennis *Grote.*

A small Heliothid allied to *Heliophana* and *Melicleptria.* It differs by the fore wings being more widened outwardly, and the claw to the front tibiæ being single. Mr. Smith says of it: "Very unsatisfactorily distinguished from *Heliophana* and probably identical with it." I cannot re-examine my type at the moment. When I established the genus, I was under the impression that the modifications of the armature of fore tibiæ gave generic characters. With the discovery of numerous Heliothid forms this opinion has become modified.

1. Heliosea Pictipennis *Grote,* Ill. Essay, p. Plate 3, fig. . California.

MELICLEPTRIA Hubn. (1816).

Type: M. Cardui *Hubn.*

This genus, which I took from Hubner, is equivalent to Lederer's first section of *Heliothis* as shown by me, and, with the same type, the equivalent of Guenée's genus *Anthæcia.* I followed Guenée in including in it

such forms as *Saguarina*, etc., but in my "New Check List" limited it more rigorously to the purple and black forms. *Celeris*, a magnificent species, is, as I twice showed from examination of specimens, a true *Melicleptria*, it was misplaced accidentally in my list. Mr. Smith has farther taken out a few species described under it by Mr. Hy. Edwards and Mr. Morrison, which with similar ornamentation are shown to differ structurally. I cannot now examine all these while he is apparently justified in his course. I cannot believe he has correctly placed *Perminuta*, but I only saw the type, and have never had the species under the microscope. He follows Mr. Edwards in regarding my genus *Adonisea* as synonymous. I suspected as much myself, but the species was too handsome to leave undistinguished, and it has a slightly different proportion from the rest. This insect, which I call "Adonis' Moth," is purply red and blue, the latter shade a very unusual one in the ornamentation of these insects. I described the genus with other Californian genera, but my present knowledge of related forms would have deterred me from doing so. The species of *Melicleptria* have naked, small or ornate eyes, which are sunken in the hairy vestiture of the retracted head. The middle and hind tibiæ are spinose. The fore tibiæ in *Pulchripennis* have a longer inner and two outer claws, and as in most of the genera the joint is short. Mr. Smith says "the body is clothed with thin divergent hair, usually of a paler color than body [?] and somewhat silky." He thus describes the sericeous somewhat olivaceous or yellowish longer vestiture on thorax and abdomen which is distinctive and with the purply red wings, with paler median spots on both pair, is characteristic of most of the species. Mr. Smith further gives the "claws of tarsi simple or but slightly dentate." In the female the ovipositor is extended beyond the conical and rather short untufted abdomen. A typical species is *M. Sueta*, with its Californian variety *Californiensis*.

1. M. Celeris *Grote*, B. B. S. N. S. I., 148. California.
2. M. Pulchripennis *Grote*, Ill. Essay, 62, Pl. III. fig. 31, *var*. Languida *Hy. Edw.* California.
3. M. Villosa *Grote*, P. E. S. P., 531, Pl. VI., fig. 6. Colorado.
4. M. Persimilis *Grote*, B. B. S. N. S. I., 117, Pl. III. 11. Colorado.
5. M. Græfiana *Tepper*, Tr. Am. E. S. 245. California.
6. M. Honesta *Grote*, Papilio I., 77. California.
7. M. Sueta *Grote*, B. B. S. N. S. I., 117. Colorado.
   *var* Californiensis *Grote*. California.

## LYGRANTHŒCIA G. and R.

Type : Anth. Rivulosa *Guen.*

The type of this genus was first described as *Crambus Marginatus* by Haworth. It is a sufficient answer to Mr. Smith's prejudiced procedure of calling this genus *Schinia*, and giving himself the air of first discovering it, to quote my words from my paper in the Buffalo Bulletin II., 220, which is the only one I had published on the subfamily *Heliothinæ*. "The

eyes are full. The fore wings of the usual shape, crossed by two or more less evident lines. The fore tibiæ have a series of three outer claws or spinose, a single inner longer terminal claw, succeeded by a row of slender spines. The species are numerous, and I refer them all to *Lygranthæcia* G. and R. They are *bina, lynx, brevis, atrites, arcifera, Spraguei, Packardi, Mortua, jaguarina Marginata, Thoureani, saturata.*" It will thus be seen that I referred all the then known species to this genus. I only left out my *Tricopis* and *Euleucyptera*, which to-day I am not willing to add, as also Hubner's *Schinia* then not known to me, or but partly. I afterwards in my "New Check List," proposed to divide the species into two genera, but incorrectly. I also described some new species (incorrectly, as Mr. Smith has shown) under *Tamila*. But the first attempt to limit this large genus scientifically is that above given, and to now call that genus *Schinia*, a term "resurrected" by myself out of Hubner for two or three of his species, is quite unjust and against the usual comity and practice, and I hope will not be followed by any one. The species I now arrange as follows: I have adopted Mr. Smith's conclusions except as above noted, but the genus is virtually my genus *Lygranthæcia*, and its value is not altered by referring to it a few species hitherto wrongly placed by me. I had not the type of *Tamila*, and was misled by Guenée's diagnosis, and my own prepossession that the flattened thoracic scales distinguished *Tamila*, while in reality all the species have them. The genus is well distinguished by the full, not ovate or narrowed eyes from its allies, and thus stands near the typical *Heliothis armiger*.

## RHODODIPSA Grote (1879).

Type: R. Volupia *Fitch*.

This genus is nearest to *Lygranthæcia*, and differs in detail of armature from *Rhodophora* and *Alaria*. The second species from New Mexico may not belong here, the front tibiæ of the type were imperfect. Both have light crimson secondaries and honey-yellow thorax. The fore wings of *Volupia* are also red with fine pulverulent pale lines, while those of *Miniana* are clay-color with broader white lines, recalling those of *L. Velaris*. Mr. Smith unites the first species with *Alaria*, and having been so fortunate as to see Dr. Fitch's type, confirms my identification in my Illustrated Essay, p. 63, and elsewhere; alone from the description certainty as to the species intended by Dr. Fitch could not be attained.

1. R. Volupia *Fitch;* Gr. B. U. S. G. S. III., 797; Ill, Ess. 63, Pl. 3, 33. Texas; Colorado.
2. R. Miniana *Grote*, Papilio I., 175; II, Pl. I., fig. 1–2. New Mexico.

## PORRIMA Grote (1875).

Type: Oria Sanguinea *Geyer*.

This is a catalogue name proposed by me instead of Guenée's generic term *Oria*, preoccupied by Hubner. I found afterwards that the near-

est ally of this moth was the *Heliothis Regia* of Mr. Strecker, a moth which I had previously referred to *Lygranthœcia* (= *Schinia* Smith) before Mr. Smith wrote on the subject. In his "Synopsis," Mr. Smith says: "Congeneric with this (*Alaria*) are *Porrima* Gr., and *Rhodophora* Guen. The former seems to differ in being rather more coarsely haired, more wooly (woolly) beneath, having the primaries a little wider, and the fringes longer. The latter has the vestiture a little finer, and the palpi slightly drooping instead of horizontal; there is also a very slight difference in the armature of the anterior tibiæ; *but compared carefully with each other the conclusion that they are identical is irresistible;* not only do they agree in outine and general characteristics but even the coloration, slight as it is, would seem to bring them together" (l. c. p. 19). The italics are mine. In his next paper Mr. Smith refers *Sanguinea* to *Schinia!* I believe Mr. Smith is right in his last conclusion, and I have referred *Sanguinea*, next to *Regia*, to *Lygranthœcia*. If this opinion should be reversed by later discoveries *Porrima* may come into use for the genus as intended by Guenée. I have quoted Mr. Smith to show how easy it is to be positive and change one's opinion quite quickly. A very long continued study and a knowledge of the greater part of our *Noctuidæ* has shown me that it is better to be not so positive as matters are at present. I differ decidedly from Mr. Smith's opinion that *Sanguinea* is like *Florida*. The genus *Porrima* must for the present be regarded as not sufficiently distinct from *Lygranthœcia*. I do not in the least object to a change in opinion upon such matters, but I object to being adversely criticised for changing my opinions by one who changes his own. The process in itself is a very natural one, without which all progress would be impossible. A scientific man is one who changes his views with facility upon the discovery of fresh evidence, and one also who is quick to see the bearing of fresh evidence upon the subject in hand.

## OXYCNEMIS Grote (1882).

Type: O. Advena *Grote*.

A Heliothid genus with shortened fore tibiæ which are corneous and terminate in a single claw. Vestiture scaly. Thorax with posterior tuft of curved scintillant scales, widening towards their tips. Eyes naked, unlashed. Abdomen short, untufted. The moth is gray, brightly marked, with distinct hadeniform ornamentation, of small size and from its essential features I place the moth next to *Triocnemis*. The type is in Mr. Neumoegen's extensive collection.

1. O. Advena *Grote*, Can. Ent. 14, 182. Arizona.

## AZENIA Grote (1882).

Type: A. Implora *Grote*.

Size small, allied to *Prothymia*. The vestiture is flattened hairy. Eyes naked, unlashed. Antennæ simple. Legs unarmed and tibiæ thinly scaled. Front with infra-clypeal plate prominent, overshadowed by a parallel,

long, distinctly tridentate, flattened clypeal protuberance. Labial palpi oblique, rather stout and longer than in *Xanthoptera*. The type is pale lemon yellow with dots in place of median lines and pale fringes. The second species is dark yellow without marks and uncolorous fringes ; the frontal armature has its outer edge roundly scalloped instead of forming the three sharp teeth of *A. Implora*.

1. A. Implora *Grote*, Papilio II., 186. Arizona.
2. A. Edentata *Grote*, Can. Ent. XV., 25. Arizona.

## EUHERRICHIA Grote (1882).

Type : Eriopus Monetifera *Guen*.

Form slender ; abdomen not exceeding the secondaries, tufted at base, and especially on third segment. Eyes naked, unlashed. Ocelli. Tibiæ unarmed. Vestiture consisting of flattened scales mixed with hair. Wings broad, entire, apices determinate, outer margin retiring below apex, full at median nervules ; a distinct accessory cell ; 9 out of 8 to apices, about half the length of 8 ; cell open ; 3 twice further from 4 than 4 from 5 at base. Hind wings with vein 5 a little weaker, indistinctly connected with median series. The species are rich reddish-brown ornamented with silver spots and lines recalling *Plusia* and having somewhat the soft rich color of *Plusia Mappa*. The species have been mistaken for forms of *Eriopis*.

1. E. Monetifera *Guen*. Can, to Florida,
2. E. Mollissima *Guen*. Can. to Florida.
3. E. Floridensis *Guen* Florida.

I conclude this paper by briefly referring to the fact that I have determined my species in many collections. I enumerate those of Mr. Thaxter, Mr. Neumoegen, Mr. Hy. Edwards, Mr. Tepper and in the Albany collections. A large number of my types are in Mr. Neumoegen's grand collection, and I have figured a good number of the species. There can thus be but few cases of doubt as to what I have described. I had intended, in memory of many kindnesses, to dedicate a second illustrated work to Mr. Roland Thaxter, but circumstances prevent me, and if he will accept the present paper on his favorite subject, I shall be glad. I know of no one who by natural temper and talent is better fitted to continue the description of North American *Noctuidæ* than Mr. Thaxter, could he be induced to undertake the work.